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ABSTRACT

This report describes the results from an exploratory project conducted for the National Center for Education Statistics. The purpose of the project was to develop and field test questionnaire items and related methods designed to capture information about the instructional processes used nationally in 8th- to 12th-grade mathematics classrooms. Data from classroom observers, short logs of daily classroom practice, and a teacher questionnaire were used to assess the quality of the items. A survey questionnaire, field tested with 100 teachers, was completed by approximately 300 mathematics teachers, and a case study was conducted with 41 teachers in similar settings with comparable responsibilities. Results of these studies were used to make 10 recommendations to improve the field test validation process and the survey items. Thirteen appendixes contain supplemental information about the study and the test items. Appendix M contains a summary, in chart form, of recommended changes to the field test items. (Contains 21 references.) (SLD)

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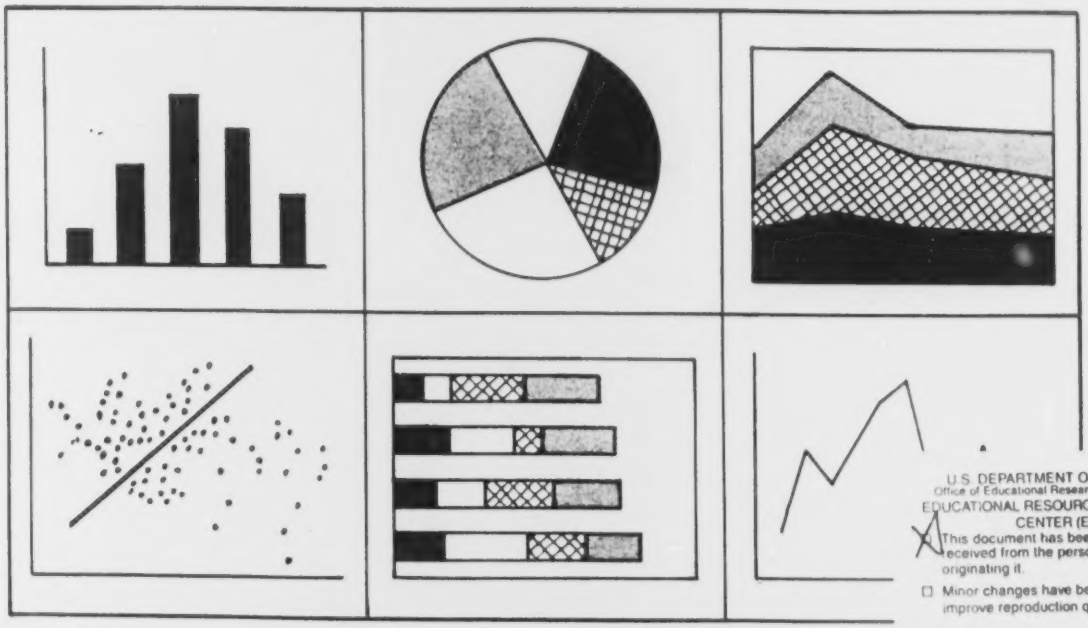
Working Paper Series

Measuring Classroom Instructional Processes: Using Survey and Case Study Fieldtest Results to Improve Item Construction

Working Paper No. 1999-08 May 1999



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Measuring Classroom Instructional Processes: Using Survey and Case Study Fieldtest Results to Improve Item Construction

Working Paper No. 1999-08 May 1999

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May 1999

Foreword

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U.S. Department of Education
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National Center for Education Statistics

May 1999

This report analyzes data from the Classroom Instructional Practices project administered through the Education Statistics Services Institute (ESSI) and funded by the National Center for Education Statistics (NCES) within the U.S. Department of Education. Among those who offered professional support are Dan Kasprzyk, John Ralph, Sharif Shakrani, Mary Rollefson, and Sharon Bobbitt of NCES; Ramsay Selden at ESSI; and Brenda Turnbull and Elizabeth Reisner at Policy Studies Associates. Mary Leighton, Ben Lagueruela and Kim Thomas provided valuable editorial and production assistance. The case study teachers, each of whom freely participated, deserve the final accolade for making the data possible.

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This report describes the results from an exploratory project conducted for the National Center for Education Statistics (NCES). The purpose of the project was to develop and fieldtest questionnaire items and related methods designed to capture information about the instructional processes used nationally in eighth to twelfth grade mathematics classrooms. Data from classroom observers, short logs of daily classroom practice kept over a month, and a teacher questionnaire were used to assess the quality of the items. Such instruments and methods can inform our understanding of options for collecting and validating survey data that could be incorporated into national data collection schemes. Knowing the reliability of self-report items can create confidence that the picture of instruction emerging from teacher surveys is likely to be accurate.

The project had two parts: (1) a survey questionnaire completed by approximately 300 mathematics teachers of eighth to twelfth grade students in randomly selected public and private schools and (2) a case study of approximately 40 teachers in similar settings with comparable responsibilities. The questionnaire, fieldtested with 100 teachers in an earlier pilot project, built on previous studies including the Third International Mathematics and Science Study (TIMSS), the UCLA/RAND Validating National Curriculum Indicators project, and Reform Up Close. The case study teachers chose one designated class on their schedule. For this class, they completed pre- and post-study questionnaires, were observed by researchers, participated in a follow-up interview, and completed four weeks of daily log forms detailing the instructional practices they used. Surveys and case studies provide information about the extent to which the proposed items generate data that accurately portray instructional experiences in eighth to twelfth grade mathematics classes.

This effort is part of a series of activities through which NCES is examining and refining data collection methods and instruments suitable for use in national programs. Surveys are among the most cost-effective and least burdensome methods, but they may not produce an accurate and reliable picture of instruction. This project was designed to improve our ability to gather more useful information about practice without adding to respondents' burden in providing data.

Background

NCES collects and publishes a broad array of policy-relevant information on the condition of education: school organization and facilities; the professional characteristics of principals, teachers, and other school staff; and aggregate demand for teachers by areas of specialization. Current and recent NCES data collections on K-12 education (or selected

grade ranges) include the Schools and Staffing Survey (SASS), the Fast Response Survey System, the National Assessment of Educational Progress, and the National Education Longitudinal Study of 1988.

However, missing from this array is similarly comprehensive and nationally-representative data that describe the real work of schools, teachers, and students. What goes on inside classrooms when teachers and students buckle down, close the door, and get to work? What types of teaching occur in schools? What is the relative instructional emphasis on broad concepts compared with specific facts? To what extent do teachers use newly-recommended instructional techniques rather than the "tried and true" methods with long traditions of use? How are students assessed? Who determines policy on homework, student discipline, and promotions?

This information is important because issues like these and others explicitly affect the quality of students' experiences in the classroom and school and presumably bear directly on student learning. To date, most detailed pictures of classroom processes and participants come from case study data collected in a small number of educational settings. That information, while often qualitatively rich, provides only a non-representative glimpse into a few classrooms—often fascinating and sometimes riveting, but always limited in scope. We can make no assumptions about the extent to which those pictures are repeated in education settings that vary widely throughout the country.

Continuing emphasis on educational accountability and productivity has heightened interest in measuring the distinct contribution of schooling to achievement. As high-stakes testing becomes more prominent, the desire to understand variation in achievement among students and between groups of students (by race or ethnicity, socio-economic status, or geographic region) will focus attention on how classroom instructional practices and the resulting opportunities for students to learn the material being assessed vary within and among schools.

Stodolsky (1996), summarized the rationale for generating a more broadly representative, yet finely textured data base:

> If we are to understand, monitor, and improve our nation's schools, accurate and timely empirical, descriptive data about how schools work must be available. The activities that take place in classrooms to engender student learning and development are the heart of any school's education efforts. It is in the transactions between and among teachers, students, materials, and tasks that deliberate efforts to educate occur. Descriptive information about

> how teaching and learning occur in classrooms and about what is taught provides the basis for monitoring the status of instruction in a large number of settings. Such information can provide periodic assessments of stability and change in instruction, particularly as changes relate to deliberate efforts to reform or alter curriculum and instruction. (p. 1-2)

Student achievement reflects—among other factors—the opportunities to learn provided by classroom experiences. Those classroom experiences include the content covered; the learning objectives enacted; and the instruction offered to achieve those objectives. The intended curriculum describes the outer limits of what we might reasonably expect students to learn; the enacted curriculum encompasses the content and instructional practices actually experienced by students; and the attained curriculum is that which the student can demonstrate knowing.

It is not sufficient to know only the level at which students achieve, since that also reflects students' prior learning and social conditioning (Porter, 1993; Berk, 1988). Nor does knowing only the gain in student learning over a particular period of time provide the information necessary to understand the events that precipitated learning. However, understanding how variation in student learning relates to variation in instructional practices could inform local, state, and national educational policy (Burstein, Oakes, Guiton, 1992; Smith 1988; Murnane, 1987). Because survey data are likely to be the major source of nationally-representative information about instructional content and practices, the quality of survey items should be initially validated and periodically confirmed (Burstein, McDonnell, Winkle, Ormseth, Mirocha, Guiton, 1995).

NCES began this series of studies of how to collect such information in 1994 with a comprehensive review of current research efforts and instruments (Leighton, Mullens, Turnbull, Weiner, & Williams, 1995). This provided the foundation for a 1995 project to review existing measurement approaches (Mullens, 1995) and to develop a module of items measuring classroom instructional processes for the Current Teachers Questionnaire of the SASS Teacher Follow-up Survey (TFS). That module included only questions that were applicable to the broad range of grades, circumstances, and content areas from which the sample of TFS respondents is drawn. This kept the focus broad and limited the extent to which more detailed information relevant to learning outcomes could be gathered. Related work revised those items to address data collection on instructional processes used by teachers of eighth to tenth graders in an effort to trade breadth for depth; narrowing the respondent range to one subject and a cluster of grades allowed inclusion of items eliciting greater detail about instruction. Those items were fieldtested with 100 teachers in three districts (Mullens and Leighton, 1996). Results from that project and subsequent

experience guided our questionnaire revisions and planning for its fieldtest. The methods, instruments, items, and validation strategies we used are extensions of those developed (and in some cases under development still) by researchers working on TIMSS (1998, 1996), the UCLA/RAND Validating National Curriculum Indicators project (1995), and Reform Up Close (1993).

Project Description

This project was designed to field test revised items on classroom instructional practices. Two main questions governed data collection:

1. How accurate and reliable are the mail survey data that can be collected from secondary mathematics teachers about their instructional practices and the contexts within which they occur?

2. Which of the revised items hold the most promise for large-scale use?

To answer these questions, we developed a teacher questionnaire and then used case studies to assess the quality of the teacher questionnaire data. In developing the items, we used methods developed by Porter and his colleagues to identify the effects of increased enrollments on the content and pedagogy of high school mathematics and science courses (1993). We also drew heavily on the work of Burstein, McDonnell, et. al. (1995), which began developing validation procedures to improve the quality of national indicators of curriculum.

Questionnaire Content

The survey included 19 items, most with subitems, covering four areas of instructional practice: (1) conditions for teaching and learning in the school and classroom; (2) course content and emphasis; (3) instruction; and (4) the availability and use of instructional resources. Some items in the "conditions" section collected information about the length and frequency of the class meetings, the number and grade levels of the students enrolled, their ability levels compared to others in the school, and the teacher's assessment of student capability to learn the course material, among other things. All are factors that affect teaching. The other items asked about the teacher's role in setting school policies and control over classroom events. Such factors affect classroom learning because they affect

what teachers choose to do for their students. Accordingly, researchers and others studying variation in classroom instructional practices frequently look for data on these factors to establish the context within which those decisions are made.

Survey items about the course collected information about the specific topics covered, the level of emphasis teachers place on certain skills and concepts, student learning objectives, assessment content, integration with other courses or subjects, and nonacademic time. This information offers an explanatory context for teacher responses to questions on instruction and instructional resources. Since previous studies have shown that course titles provide little information about the specific academic topics covered, one item asked for the specific content covered.

Items on instructional techniques formed the core of the questionnaire. One asked about the frequency with which teachers use various instructional methods in the target class. It included twelve activities, ranging from those commonly associated with traditional teaching (such as lecture and student recitation or drill), to those associated with the National Council of Teachers of Mathematics (NCTM) recommendations (such as student discussions of approaches to solving problems, explanations of mathematical thinking and open-ended questions), and those common to a range of styles (such as giving tests). A companion item focused on 24 student lesson activities, similarly distributed among traditional approaches (e.g., working on exercises, worksheets, or workbooks), NCTM recommendations (e.g., doing projects/assignments that take a week or more to finish), and cross-cutting activities (e.g., correcting or reviewing previous day's homework). Finally, teachers were asked to identify the formal and informal ways in which they had students demonstrate proficiency. The options ranged from memorizing facts or formulae to generating original examples of mathematical concepts.

Having appropriate materials and the skills to use them affects the choices teachers make about instruction. Therefore, two nearly identical items collected information from teachers about the availability of various materials and equipment during classroom instruction and their use of those items, and the extent to which the same materials were available to and used by students.

The questionnaire is in Appendix A.

Mail Survey

We conducted the mail survey during a two-month period between April 16 and June 23, 1997. Using lists of public and private secondary schools that were randomly drawn from three census categories (central city, urban fringe/large town, and rural/small town), we created a sample of 140 schools.[1] To the district superintendent of the selected public schools, we sent an explanatory letter, enclosing information about the fieldtest and advising them we would be contacting the school's principal. We also sent explanatory letters to the principals of the schools and followed up with telephone calls to answer questions and confirm participation. From schools that agreed to participate, we obtained the names of mathematics teachers for eighth to twelfth graders. To a random selection of 418 of those teachers, we mailed a copy of the questionnaire and a letter that described the project and asked them to complete and return the survey. No gifts or rewards were offered. We mailed the surveys on April 16th and followed up with postcards two days later. Between May 8th and May 23rd, we contacted non-respondents, and, where necessary, mailed and faxed replacement surveys. We stopped data collection on June 23, 1997. Of the 418 teachers, 296 returned completed surveys, 13 returned written refusals, and 88 did not respond. Twenty-one surveys were returned because the addressee did not teach mathematics or was currently on sabbatical. The completed questionnaires represent 71 percent of all surveys sent out and 75 percent of the surveys that reached in-scope respondents. A complete breakout of these numbers is contained in Appendix B.

Case Studies

During April and May 1997, we conducted case studies in six areas across the country. To attain some measure of geographic dispersion yet limit travel costs, project coordinators identified six population areas (including two nearby) that would provide some diversity in district size and regional variation. Those areas were Baltimore City, Frederick, and Hagerstown, Maryland; Austin, Texas; Charleston, South Carolina; Milwaukee, Wisconsin; and Aberdeen, Bremerton, and Olympia, Washington. We sent an explanatory letter to the relevant district superintendents, enclosing information about the fieldtest and advising them we would be contacting the schools' principals for permission to contact the mathematics teachers. From the principals of those public schools and the

[1] To obtain a sample of this size, we called 164 schools (87 public, 77 private). Twenty four schools did not participate because they had no staff member whose job description fit the study's needs.

private schools in those communities, we obtained approval to approach their eighth through twelfth grade mathematics teachers individually to recruit their participation in the case study. Through introductory letters and follow-up telephone calls to those teachers, we obtained commitments from fifty teachers.[2] Each teacher identified one particular course ("designated class") for which they were willing to be observed once and to record classroom activities daily for four weeks. Together the classes covered the curriculum spectrum from eighth grade mathematics to Calculus.[3] Forty-one of the 50 volunteers ultimately completed the case study.

There were five parts to the case study process: a mailed questionnaire, classroom observation, teacher interviews, daily class logs, and a second administration of the mail survey.

- **Mail questionnaire:** Before the case study began, participating case study teachers received the instructional practices questionnaire in the mail and completed it. They retained it until they could return it personally to the observer onsite. The questionnaire is in Appendix A. This was identical to the questionnaire mailed to teachers in the larger sample.

- **Classroom observation:** At the beginning of the case study, a researcher observed a class period in the teacher's designated class, independently identifying and recording on a log form instructional objectives, classroom activities of the teacher and students, and availability and use of instructional materials.

- **Teacher interview:** Before the interview, teachers were asked to complete a classroom log form describing the class that had just been observed. During the following discussion, the observers compared their coding with the teacher's coding of the same class, asking teachers to describe the instructional activities that had occurred, using the log form as a topic guide. Where teachers and observers differed in how they described and recorded a particular instructional activity, they each described what they observed and how it compared with their interpretation of the log form description. These interviews enhanced the teacher's understanding about the meaning of key terms and the observers' understanding of the conditions of instruction and the prevailing classroom routines and expectations.

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[2] Of the fifty case study volunteers, 28 were in public schools and 22 were in private; 25 were women, 25 were men.

[3] Of the 50 classes, 15 were Algebra I, 9 were Geometry, 8 were eighth grade Algebra or Pre-algebra, 7 were Algebra II, 5 were Calculus or pre-Calculus, and 6 were other types of mathematics courses.

- **Daily logs of classroom activities:** For the equivalent of four weeks of teaching (20 daily lessons or the appropriate number of block classes), case study teachers kept a daily log of their designated class. Using the log forms provided, teachers recorded a brief overview of the lesson content and structure, student learning objectives and amount of time spent on each, teacher and student activities, and materials used during that period. Each week, teachers mailed completed log forms to researchers. The case study teacher log form is in Appendix C.

- **Mail questionnaire:** At the conclusion of the data collection period, participating teachers received another instructional practices questionnaire in the mail to complete and return. Only 20 of the 41 case study teachers completed this second questionnaire, so the value of those questionnaires as a reliability measure is severely diminished.

Analysis

We used the mail survey data to calculate item response rates and item use rates, examine the distribution of responses across response options, and investigate potential threats to clarity for each survey item.

- **The mail questionnaire item response rate** is a measure of the proportion of all responses that is valid for each survey question; it shows the level of item clarity, precision, and respondent compliance with survey directions. It is calculated by dividing the total number of respondents that could have answered into the number that gave meaningful answers. Some questions were irrelevant for some respondents. The item response rates were generally high (97 percent or higher), ranging from 88.2 percent to 100 percent; they are detailed in Appendix D. In the following discussion, we identify items with response rates less than 97 percent.

- **The mail questionnaire item use rate** is a measure of the number of times that survey respondents indicated they used each instructional objective, method, or material, and identifies the most frequently reported classroom conditions, content, instruction, and materials. It is calculated by dividing the number of respondents that could have answered into the number who gave meaningful answers. Item use rates are listed in Appendix D.

- **The distribution of mail questionnaire responses** is a measure of the appropriateness of the response options. The distribution of mail survey responses is in Appendix E. Where appropriate, discussions of the distributions are included below.

- **Potential threats to clarity** identify instances in which respondents may not have understood the terminology or may not have had sufficient

information to answer the question. Where appropriate, they are reported below.

We used case study data to assess the validity and reliability of teacher responses to survey items on student learning objectives, instructional activities, and material use and availability. This included analyzing teachers' conceptual understanding of the student learning objectives and teacher and student lesson activities; the accuracy with which teachers estimated the amount of instructional time they and their students spend on specific activities; and the reliability of teachers' responses to two questionnaires completed six weeks apart.

We used the case study data to examine the distribution of responses across response options and investigate potential threats to clarity for each survey item.

- **The distribution of case study questionnaire responses** is a measure of the appropriateness of the response options. The distribution of case study survey responses is in Appendix F. Where appropriate, discussions of those distributions are included below.

We also used case study data to compare the teacher-completed classroom logs with observer-completed logs to make the following analyses:

- **Case study teacher and observer use of classroom log items** is a measure of the number of times during observations that teachers and/or observers indicated the teacher used each instructional objective or method, student activity, or materials. It identifies the most frequently used classroom instructional concepts and activities. We calculated item-use rates for teachers, observers, and both teachers and observers during the observed classes, and for teachers during the four week case study. Results are shown in Appendix G.

- **The percent agreement between case study teachers and observers on occurrence of student learning objectives and instructional activities** is a measure of the extent to which case study teachers and classroom observers both viewed a lesson as having included listed objectives and activities. It reveals among other things the extent to which teachers and observers demonstrated a similar understanding of the concept in question. Results are shown in column a of Appendix H.

- **The percent of teacher/observer nonagreement in which the teacher indicates the objective or activity occurred and the observer indicates it did not** shows the direction of nonagreement between case study teachers and observers for each student learning objective or instructional activity. For all but two items, teachers viewed an occurrence as

having happened although observers did not see it. Results are shown in column b of Appendix H.

- **The percent agreement between case study teachers and observers on length of time spent on student learning objectives and instructional activities** measures the extent to which teachers and observers who agreed on occurrence, next agreed on the length of time it lasted. Results are shown in columns c and d of Appendix H.

- **The percent of teacher/observer nonagreement in which the teacher indicates the objective or activity occurred for a longer period of time than the observer did** shows the direction of nonagreement between case study teachers and observers for each student learning objective or instructional activity. Results are shown in column e of Appendix H.

Furthermore, we compared the teacher-completed questionnaire responses to the accumulated activity recordings from four weeks of classroom logs to make the following analyses:

- **The percent agreement between case study teacher questionnaire responses and logs on the occurrence of student learning objectives and instructional activities** measures the consistency of teachers' survey responses with their daily logs of classroom instructional objectives and activities maintained over a minimum of four weeks. It is a measure of the extent to which teachers' survey responses reflect the same type of classroom activities as recorded on daily logs. Results are shown in columns a and b of Appendix I.

- **The percent of teacher questionnaire and teacher log nonagreement in which teachers underreport occurrence on the questionnaire, compared with log reports,** further explores teacher survey and log nonagreement. It measures the percent of time in which the teachers' survey responses indicate that an objective or activity occurs less frequently than their daily classroom logs indicate. Results are shown in column c of Appendix I.

- **The percent agreement between case study teacher questionnaire responses and logs on the duration of student learning objectives and instructional activities** measures the consistency of teachers' survey responses with their daily logs of classroom instructional objectives and activities maintained over a minimum of four weeks. Results are shown in columns d and e of Appendix I.

- **The percent of teacher questionnaire and teacher log nonagreement in which teachers underreport activity duration on the questionnaire** further explores teacher survey and log nonagreement. It measures the

percent of instances in which the teachers' survey responses indicate that an objective or activity occurs for less time than their daily classroom logs indicate and helps to illuminate the direction of nonagreement between survey responses and daily classroom logs. Results are shown in column f of Appendix I.

Finally, we used the case study data to compare the first questionnaire responses to the second questionnaire responses to assess the reliability of the items:

- **The percent agreement between case study teachers' responses to the first and second questionnaires on the frequency and duration of classroom instructional practices** measures the "test-retest" reliability of teachers' survey responses completed approximately six weeks apart. Results are shown in Appendix J.

Detailed descriptions of each analysis are included in Appendix K.

When comparing a teacher's recording on a daily log to the observer's daily log, we assumed the observer to be the objective and disinterested party, and so measured the extent to which the teacher's responses agreed; when comparing the accumulated responses from four weeks of the teacher's logs to the teacher-completed survey responses, we used the logs as "truth." To determine how close is close enough, we followed the lead of Burstein, McDonnell et. al. (1995) to establish standards for comparing two responses about the same event or set of events. For each item or subitem, we calculated (and report in the appendices) both the percentage of response pairs that were exactly identical and the percentage of those that were within one response category of each other. If 75 percent of the response pairs for each subitem are within one response category, we report the paired responses on that subitem as substantially consistent.

The observer data used in these analyses are limited to the items included on the classroom log form, primarily items collecting information on student learning objectives, teacher actions, student activities, and material use and availability. For all comparisons involving the independent observer data, we removed subitems for which little or no use by observers or case study teachers resulted in too few cases to assess. We eliminated items receiving ten or fewer indications of use in the 82 records of the 41 classroom observations: two of nine student learning objectives, four of 12 teacher actions, six of 24 student

activities,[4] and four each of eight teacher and student instructional materials. Those items were retained and considered, however, when we compared teacher questionnaire responses with teacher logs and when we compared responses to the first and second teacher questionnaires. A complete list of eliminated items is contained in Appendix L.

To get an estimate of the accuracy with which teachers describe on a one-time questionnaire what they do throughout a semester without presenting them with too great a response burden, we collected log accounts of classes for the equivalent of four weeks of teaching. Then we compared teachers' responses on the first questionnaire to the summed log accounts for the four weeks following. If the methods and items were apt and respondents' memories were good, and if the four week period was representative of the activities throughout the semester, the frequency and duration of the instructional activities in the daily regimen recorded during the case study would be a relatively close match to the teachers' responses on the questionnaire.

First, to establish a common set of definitions with observed teachers, we compared teacher log forms with researcher observation forms for the same class. Using the information from the observed classes, we compared the learning objectives, teachers' actions, and student activities recorded by the researcher with those recorded by the teacher for the same class. Differences in records generated discussion of log terms and eventually, greater confidence that what teachers communicated in their logs would be properly interpreted by the researchers. Second, to examine how well questionnaire responses reflected the frequency and duration of activities throughout a semester, we compared teachers' four weeks of log data to their responses to the first questionnaire. We summed the log data to identify the frequencies with which teachers employed instructional techniques and the typical amount of time each was used, then compared those numbers with the appropriate questionnaire responses. Finally, to determine the reliability of the data, we examined the extent to which teachers' responses to identical questions remained

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[4] The two student learning objectives occurring infrequently enough during the observed classes to warrant removing them from analyses are (1) collect data (e.g., observe, measure, count) and (2) order, compare, estimate, and approximate. The infrequently occurring and therefore eliminated teacher actions are: (1) demonstrate a concept using three-dimensional tools, (2) provide remedial or enriching instruction to a pull-out group, (3) administer a test or quiz, and (4) demonstrate uses of technology. The student activities are: (1) write a report, (2) conduct lab or field work, (3) give oral reports, (4) work on week-long assignments, (5) participate in structured cooperative-learning activities, and (6) take a test or quiz.

the same over time, using data from the first and second questionnaires completed approximately six weeks apart.

When the data did not match (e.g., a teacher's survey response indicated lectures once or twice a month, but the log data document lectures once or twice a week during the case study), we also examined the direction of each mismatch to determine if teachers reported events happening more or less frequently (and for more or less time) on questionnaires than on logs.

To evaluate consistency, we again used Burstein and McDonnell's standards. If 75 percent of the response pairs for each subitem were within one response category, we considered the paired responses on that subitem substantially consistent.

When comparing responses from teacher questionnaires completed before and after the period of log-keeping, we used the responses from the later questionnaires to validate the first questionnaire. Only 20 of the 41 case study teachers completed the second questionnaire, so our analysis of teachers' responses on the two surveys was limited to those 20 sets, which supports limited generalizability. The case study teachers are their own comparison group, since we use their responses not to understand their teaching practices, per se, but to assess the reliability of their initial responses.

To understand the characteristics of each item and obtain information on how each could be improved, we analyzed the items separately. This is different from the ways the final items are likely to be used by researchers or data analysts. Analysts using data from such items in their research generally combine multiple interrelated items to create more parsimonious composites describing underlying constructs of interest that no single item fully explains. Principal components analysis is one technique by which multiple variables are simplified and their inherent information amplified. "...instead of analyzing a large number of original variables with complex interrelationships, the investigator can analyze a small number of uncorrelated principal components."[5] Combining items into one or more components also reduces the original variability contained within each original item, mitigating concern about the potential variability of individual items.

Within each category of information collected, we report only those results that appear to be out of the norm or that provide unique and interesting information about the

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[5] *Computer-Aided Multivariate Analysis*, Affifi and Clark, 1990, p. 372.

quality, reliability, and future promise of the items fieldtested, focusing specifically on response rates, distribution of responses, and potential threats to clarity (primarily from the mail questionnaire data) and consistency and reliability (primarily from case study data).

Results

We report analysis results by areas of practice: teaching and learning conditions and classroom context; course content and emphasis; instruction; and instructional materials. Within each section we present information on response rates, distribution of responses, potential threats to clarity, and data about the consistency and reliability of self-report questionnaire responses.

Items Assessing Teaching and Learning Conditions and Classroom Context

Items in this section include those collecting information about the length and frequency of the class meetings, the number and grade levels of the students enrolled, their ability levels compared to others in the school, and the teacher's assessment of student capability to learn the course material. Those items were:

1. Course title of designated class
2. Class length and frequency
3. Grade levels of students enrolled
4. Percentage of students functioning at different ability levels (quintiles)
5. Percentage of students capable of learning the required material
6. Teacher influence on student grouping, student selection, and determining classroom discipline policies
7. Teacher control in planning or teaching regarding decisions made (a) at the department, school, or district level and (b) at the classroom level

14. Context factors (such as language diversity, social stresses, equipment shortages) that may require accommodation in instruction

Response rates. Two items had relatively low response rates (about 88 to 93 percent, compared with an overall 97 percent response rate). Item 3 asked respondents to record the number of students enrolled in the designated class who were at each grade level from sixth to twelfth. (An ungraded option was also offered.) Eighty-eight percent of all respondents provided appropriate responses. The most common inappropriate entry was a checkmark to indicate student grade level instead of the specific number of students.

Item 7 also had relatively low response rates for some parts of the item. Respondents were asked to differentiate between two avenues of control over certain areas of planning and teaching: control "through participation in department, school, or district decisions" versus control "in my own classroom." Response rates to the broader form of control ranged from 93.9 percent to 95.3 percent. Response rates to classroom control were uniformly higher, ranging from 97.6 percent to 99.3 percent. One or more of the following may have provoked the lower response rates: (1) the page layout (see Item 7 in Appendix A) required teachers to respond to the first segment by marking their responses to the left of the items (in contrast to responding to the more customary right side of the item), and some respondents may have failed to see that responses in that location were necessary; (2) some teachers may not have understood the type of control referenced; (3) some respondents may not have been able to differentiate conceptually between the two avenues of control; and (4) some teachers may have little opportunity or inclination to participate in decisions outside their classrooms and may have been dissuaded from describing the limited extent of their influence in that arena. In contrast, the response rates on the narrower classroom control may have been uniformly high because responses were marked to the right of the item, and/or because classroom control is a known issue and few teachers would be without opinion on their level of control within their own classroom.

Item 4 on the relative academic ability of students had a response rate of 97 percent. This is noteworthy since the item required up to five numerical responses that together totaled 100 percent, a format considered difficult to manage.

Distribution of responses. The distribution of responses to items on the conditions and context of instruction seemed appropriate. Some were flat, indicating wide and relatively equal variation; others were peaked in the middle showing fewer respondents on either extreme. We were especially interested in skewed distributions to understand the appropriateness of the response option scale. There were three such distributions in items on the conditions and context of learning. Item 7 on classroom control had two subitems each showing a large percentage of respondents with "complete control" (4 on a scale of 0 to 4) over (d) selecting teaching techniques (80.0 percent) and (e) determining the amount of homework to be assigned (78.0 percent). Conversely, the percentage of respondents placing themselves on or toward the "no control" end of the spectrum (0, 1, and 2 on a scale of 0 to 4) for those two parts was very low, totaling 3.0 percent (d) and 3.4 percent (e). Two distributions in Item 14 on the contextual factors influencing teachers' decisions also show heavy skew. Asked about school safety, 80.4 percent of respondents perceived no threat (0 on a scale of 0 to 3) to students' personal safety (f) and 82.4 percent indicated no perceived threat to their own personal safety (o).

Potential threats to clarity. Four comments indicated difficulty with Item 4, which asked teachers to indicate their students' academic ability levels in mathematics. Two suggested that it is difficult to distinguish between ability and class performance. One teacher wrote that responding involved "a lot of guessing," and another said that the intervals (*much above* the school average; *somewhat above*; etc) were "too broad and arbitrary."

Nine of the 297 mail respondents offered written comments about some aspect of Item 7, most of which concerned the forced distinction between the two avenues for control. Six of those comments suggested that it was difficult to indicate control "through participation in department, school, or district decisions" because the distinction between that and control "in my own classroom" was fuzzy, vague, or unclear. Another respondent indicated that his level of control in the department was different from his control in the school and in the district and combining all three areas into a single response was not possible.

Reliability of items on teaching and learning conditions and classroom context. Of the five items assessing teaching and learning conditions for which we have data[6], three showed extremely strong agreement between case study teachers' responses on questionnaire 1 and on questionnaire 2. Those who completed both the first and second surveys gave the same answers each time on all 14 subitems on Item 14 (context factors), all fourteen subitems on Item 7 (teacher control); and two of the three subitems on Item 6 (teacher influence). On the other hand, their early responses were different from later ones on Item 5 (percentage of students capable of learning the material) and all five subitems of Item 4 (student ability levels). There are several reasons why this might be so. The structure of both items is open-response and many more responses are possible and feasible compared to closed-ended questions. Rather than recalling a known percentage, it seems more probable that teachers respond to the item by estimating anew each time.

Items Assessing Course Content and Emphasis

Six survey items collected information about specific topics covered during the course, the level of emphasis teachers place on certain skills and concepts, student learning

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[6] We do not have comparative information on course titles, class length and frequency, and student grade levels (Items 1, 2, 3).

objectives, assessment content, integration with other courses or subjects, and nonacademic time. Those items were:

8. Content areas
9. Lesson content emphasis
10. Student learning objectives
11. Assessment content
12. Interdisciplinary teaching
16. Average nonacademic time

Response rates. Only two items on course content and emphasis had low response rates. In contrast to open response Item 4, described above, Item 8 on specific areas of course content required written numerical responses in up to 15 spaces spread over two pages, totaling 100 percent. We knew this item might be difficult; indeed, it has evolved from several other studies efforts to make manageable the task of acquiring course content information. However, we decided it was worth trying. Ten percent of the surveys had unusable responses, mostly because the responses totaled something other than 100 percent. The rate of usable responses may have been higher had we required teachers to total their answers; instead we inserted "100" in the total line to reaffirm the directions. Most respondents indicated that their designated course covered four to seven of the content areas listed. This suggests that the item can capture some of the content variation among courses with the same title, but did not advance understanding of how to estimate relative emphasis.

The first portion of Item 9c requesting information on the frequency with which teachers emphasize broad mathematics concepts had a response rate of 95.9 percent—lower than adjacent items. There is no apparent formatting reason why 11 survey respondents left this subitem blank, more than any other segment of this item. Because it is sandwiched between two items with higher item response rates (97.3 and 98.3 percent), the lower rate seems to suggest difficulties with the conceptual understanding of the item: what are broad mathematics concepts and how does one emphasize them during instruction?

Distribution of responses. Two items related to course content and emphasis have skewed distributions of responses. On Item 10b, 81.2 percent of mail respondents indicate they include understanding concepts, relationships, and theorems as a student learning objective more than one period per week, the highest frequency option. In Item 11a, 88.2 percent of responding teachers say they include items that require students to compute answers on their student assessments twice or more per assessment, again the highest frequency option.

Data from teacher observations and case studies document the frequent occurrence of teachers striving to help students understand concepts, relationships, and theorems (Item 10b). During the 41 classroom observations, 92.7 percent of the teachers and observers indicated this student learning objective occurred. It was also the most frequent student learning objective during the four-week case studies, with teachers indicating that it was part of 83.6 percent of the lessons taught during that time.

Potential threats to clarity. Written comments about items assessing course content and emphasis primarily concerned Item 8, asking teachers to indicate the time they spend in that class on 15 mathematics content areas. In addition to the expected (and obtained) comments that the list was too long and included too many categories, some teachers said the item was difficult to answer because (1) their teaching overlaps concepts across these defined areas; (2) they teach some concepts indirectly; or (3) they vary the content focus or emphasis over time in a way that makes it difficult to respond to the item. These teachers could not reconcile their understanding of their designated course's instructional content to the construction of this item.

Consistency of data on student learning objectives. Teachers' daily instructional objectives for students are important because they provide the basis on which the teacher makes a host of other pedagogic decisions. Item 10 in the teacher questionnaire collects information on the frequency with which teachers employ nine general student learning objectives.

Questionnaire responses from case study teachers indicated high use of four learning objectives (listed in order of frequency): (1) understand (e.g., concepts, relationships, theorems); (2) perform mathematical operations, execute algorithms, classify; (3) solve "story" problems with familiar structures, replicate proofs; and (4) memorize (e.g., facts, definitions, or formulae). The learning objectives used least were (in order of least use): (1) build and revise theories, develop proofs; (2) collect data (e.g., observe, measure, count); (3) order, compare, estimate, approximate; (4) interpret data (e.g., charts, graphs, tables); and (5) recognize and solve story problems with unfamiliar or complex structures. The same patterns of use occurred during observations: two of the learning objectives occurred infrequently enough that we did not collect sufficient data to analyze. Only five observers and/or case study teachers indicated that collecting data (Item 10c) occurred and only six indicated that ordering, comparing, estimating, and approximating (Item 10d) occurred

during those observed classes.[7] Because of this low use, we have not included these two subitems in analyses comparing teacher and observer responses.

For all 41 observed classes, we compared the student learning objectives observed by the researcher with those that the teacher indicated occurred during the observed class. Agreement indicates that both teacher and observer said the learning objective occurred; nonagreement indicates that either the teacher reported it as happening and the observer did not, or the observer reported it as happening and the teacher did not. Over all of the learning objectives included in all the observed lessons, teachers and observers agreed 78.9 percent of the time. The level of agreement between teachers and observers was greater than 75 percent for four of the seven objectives for which we report data: 90.2 percent agreement for performing mathematical operations was the highest and 65.9 for memorizing was the lowest.

As these two extremes suggest, the level of teacher/observer agreement seemed to vary by the degree to which the student learning objective was observable by a classroom visitor or was explicitly stated to the class or to the observer by the teacher. For example, it was usually clear when students were performing mathematical operations, but often difficult to observe that students were expected to be memorizing. The learning objectives with the lowest rates of agreement (memorizing facts, definitions, or formulae; recognizing and solving story problems with unfamiliar structures; building and revising theories or developing proofs) are less visible and simply more difficult to detect. This suggests that learning objectives not observed by classroom researchers may indeed have occurred, but were simply not observed.

We examined the circumstances of such nonagreement between teachers and observers to identify whether teachers or observers were more likely to report that a particular learning objective had occurred. Overall and for all learning objectives, teachers were more likely than observers to report that a learning objective was part of the observed lesson. For five of the objectives, disagreements occurred as often when teachers noted an event that observers missed as the reverse. For the other two, teachers reported using an objective when researchers reported they had not observed it.

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[7] Discussions with case study teachers suggest that some teachers may consider (10d) ordering, comparing, estimating, and approximating not as learning objectives but as basic skills that are systematically taught (and perhaps little used in class).

We also examined the level of agreement between teachers and observers on the minutes spent on each learning objective. That information indicates a high level of agreement between teachers and observers on the minutes allocated toward each student learning objective for a given class period. Agreement within one response category between teachers and observers was at least 75 percent for each of the seven objectives, and was 100 percent for two objectives. There was no pattern to the direction of nonagreement in the other five objectives, with teachers indicating either more or less time allocated than observers noted.

To learn more about the quality of questionnaire items assessing student learning objectives, we measured the consistency of teachers' survey responses of the frequency with which they employed each of the nine student learning objectives with their daily log entries over four weeks. For three of those objectives, the level of agreement between logs and questionnaires was greater than 75 percent. Those with a high level of agreement were understanding concepts, relationships, and theorems (10b); performing mathematical operations (10e); and building and revising theories (10i). The two most commonly used objectives (10 b, 10e) had two of the highest levels of agreement.

Examining the directions of the nonagreement between a teacher's questionnaire responses and log entries, we discovered that the majority of teachers underreported on the questionnaire, compared to the portraits of instruction obtained from their daily logs. Fully 71.2 percent of all nonagreeing responses underreported on the questionnaire the frequency with which student learning objectives occurred in their classrooms. This was also true for individual learning objectives: the percentage of teachers underreporting on the survey was greater than 50 percent in eight of the nine student learning objectives.

Reliability of items on course content and emphasis. Of the five items[8] assessing course content and emphasis for which we have information to compare teachers' responses on questionnaire 1 and on questionnaire 2, four items showed extremely strong agreement. All eight subitems on Item 9 (lesson content emphasis), all nine subitems on Item 10 (student learning objectives), 11 of the 12 subitems on Item 11 (assessment content), and all of the three subitems on Item 12 (interdisciplinary teaching) had high levels of agreement. Furthermore, the eight responses in Item 9b on the typical length of time spent per class period emphasizing each dimension all had more than 75 percent agreement within one response category. On the other hand, on Item 16, which asked

[8] We did not compare teacher responses on Item 8 (content areas) that required up to 15 open-ended responses totaling 100 percent.

teachers to estimate the amount of time spent on nonacademic tasks, answers varied a lot from questionnaire 1 to questionnaire 2. Similar to Items 4 and 5 discussed under teaching and learning conditions, the explanation may simply be that the answers are open-ended, requiring a percentage response that teachers may newly construct each time.

Items Assessing Instruction

Three multi-part items collect information about the frequency and duration of teacher instructional actions, student activities, and the ways in which students demonstrate proficiencies. Those items were:

13. Teacher actions
15. Student activities
17. Student demonstration of mathematics competencies

Response rates. Two related items on tests and quizzes had relatively lower response rates than the 97 percent average. On Item 13i, the second portion asks teachers who administer tests or quizzes to indicate the amount of time the assessments typically take. The response rate was 95.9 percent for this item. Of the 14 unusable responses, nine were missing and five were inappropriate (two responses were circled rather than one). On Item 15w the second portion had a similar response rate of 96.6 percent. Related to 13i on teacher time, Item 15w asks for the amount of time students spend taking tests, quizzes, or other assessments. Of the 11 unusable responses, five were missing and six were inappropriate.

Distribution of responses. There are several skewed response patterns on the mail questionnaire items assessing instructional practices. The following two items show a high percentage of teachers who indicate they do the following more than once a week (the most frequent response option):

Sub Item	% Giving Highest Frequency	Sub Item Content
13a	76.9 percent	lecture, perhaps occasionally soliciting brief student input or using the board or overhead projector to highlight a key term or present an outline
13b	70.7 percent	demonstrate a concept, using two-dimensional graphics such as drawings on the board, overhead projector, or computer

The prevalence and frequency of lecturing as indicated in the mail survey responses above is corroborated by the case study logs that indicate that lecturing was the most common teacher instructional activity, occurring at least briefly during 80.9 percent of the 700 individual class sessions covered by log-keeping.

Similarly, four items on student activities have skewed responses suggesting high usage. The following shows the percentage of respondents who indicated on questionnaires that their students do the following more than once a week:

Sub Item	% Giving Highest Frequency	Sub Item Content
15a	83.4 percent	listen to or observe teacher presentations
15h	85.1 percent	correct or review previous day's homework

Our interviews with case study teachers suggest that these percentages are reflective of practice. Observations offered mixed evidence. During the observed classes, all teachers and observers indicated that students listened to or observed teacher presentations; 54 percent indicated that students worked on their previous day's homework for at least a small portion of class. It is difficult to explain the differences on the homework item, since other experiences suggest that it is a common occurrence and no format differences exist that would affect responses.

Potential threats to clarity. Written comments about the three items assessing instructional methods on the returned mail surveys indicate that some teachers see tests and quizzes as substantively different events and could more easily respond to Item 13i on frequency of occurrence if they were two separate items. Another saw redundancy between 13f (provide individual or small group tutoring as needed during individual seatwork or small group activities involving everyone in class) and 13l (set up and monitor or supervise cooperative learning activities), "since cooperative learning takes place in small groups."

Consistency of data on teacher instructional actions. The items on the instructional activities of the students and teacher are the core of the questionnaire. They seek to provide information about specific instructional events that often occur in secondary mathematics classrooms. Item 13 collects information on the frequency and duration of a range of activities in which teachers may engage while teaching.

Questionnaire responses from case study teachers identify three teacher activities that receive high use: lecture, demonstrate a concept using two dimensional graphics, and provide individual or small group tutoring. Other teacher activities are little used: demonstrate a concept using three dimensional tools, provide remedial or enriching instruction to a pull-out group, and administer a test or quiz. Similar patterns of use and nonuse occurred during observations and we removed those three subitems plus "demonstrate uses of technology" from analyses comparing teacher and observer responses because of insufficient data[9].

To determine the similarity with which teachers and independent observers interpreted the teacher activities in the classroom and on the survey, we compared the log entries of case study teachers and observers using a similar process to that described above for student learning objectives. These data indicate a high level of agreement between teachers and observers on the occurrence and duration of teacher instructional activities. During all of the observed lessons, teachers and observers agreed on 84.6 percent of all teacher activities. In seven of the eight activities, the level of agreement between teachers and observers about whether the activity occurred was 75 percent or greater.

The highest rates of agreement between teachers and observers were for lecturing (97.6 percent) and providing individual or small group tutoring (95 percent). Observers most often disagreed with teachers on whether or not teachers had "stimulate(d) student discussions of approaches to solving problems, explanations of their mathematical thinking, or open-ended questions." For example, although case study teachers might say after class that they had stimulated student discussions of alternative approaches, observers did not classify the observed student discourse in the same way. Consequently, that item had the lowest agreement rate: 55 percent.

The same pattern appeared in the other instances of nonagreement between teacher and observer: where there was nonagreement on whether an activity occurred, teachers

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[9] During the case study observations, the teacher activity of demonstrating uses of technology was recorded on the 82 observation forms only nine times, too few to provide reliable information and the data are not included. Interestingly, though, of those nine times, eight were recorded by teachers and only one recorded by an observer. Even for such a small number of occurrences, this seems overwhelmingly lopsided. At best the ratio suggests seven "unanswered" statements in which teachers said they were demonstrating technology to students. Although no further information from observers is available to enlighten those events, it is possible that the instances involved calculator uses or demonstrations, rather than other forms of "technology" use.

were more likely to report that it did happen than were observers. In 94 percent of the instances in which teachers and observers had different entries on the observation form, teachers indicated the activity had occurred and observers indicated they had not seen it.

We found a high level of agreement between teachers and observers on the minutes spent on each teacher instructional activity that occurred during the observed class period. Agreement within one response category between teachers and observers was at least 75 percent for seven of the eight teacher activities, and 100 percent for five of them. In instances of nonagreement with observers on the length of time allocated to each teacher instructional activity, there was no systematic pattern to teacher responses. Teachers were just as likely to underestimate the amount of time spent as they were to overestimate, in comparison with observers' estimates.

We also measured the consistency of teachers' survey responses about the frequency of instructional activities with their daily log entries during the four week case study. The item levels of agreement averaged 61.9 percent agreement across all logs and questionnaires. Lecturing had the highest level of agreement at 80.5 percent, while two items had rates less than 50 percent: 28.2 percent for working on administrative tasks while students worked on assignments, and 48.7 percent for leading students in recitation, drills, or question-and-answer sessions.

Investigating the direction of the nonagreement between logs and questionnaire responses suggests that teachers were more likely to underreport the occurrence of their activities when responding to the questionnaire. For eight of the twelve activities, more than 50 percent of those respondents whose two records did not agree underreported the occurrence on the questionnaire. This suggests that the following activities may occur more frequently than survey results indicate: recitation and drill, administrative tasks, small-group tutoring, student discussion on multiple approaches to problem solving, and student-led discussions. Teachers were more likely to overreport on the questionnaire the frequency with which they demonstrate concepts using two- or three-dimensional graphics and set up and monitor cooperative learning activities.

Of the twelve teacher activities, the two with the lowest agreement rates between logs and questionnaires also had the highest rates of underreporting on the questionnaires. For example, 90 percent of the case study teachers whose questionnaire responses (about the frequency with which they worked on administrative tasks) did not agree with their log records underreported that activity. Their log records indicate that they actually worked on administrative tasks more frequently than they indicated on the questionnaire.

There was substantial agreement between teacher questionnaire responses and teacher logs summed over the case study period on the duration of the teacher's instructional activities. In all but two teacher activities, the questionnaire responses of at least 50 percent of the case study teachers closely matched log records, and for six of the twelve activities those records agreed for more than 75 percent of teachers. The highest levels of agreement, ranging from 82.9 percent to 95.1 percent, were recorded for lecturing, small group tutoring, administering a test, leading student discussion of multiple approaches, demonstrating concepts with two-dimensional graphics, and leading recitation and drills, while the least agreement was associated with demonstrating concepts using three-dimensional tools and providing remedial instruction to pull-out groups. Where teachers' questionnaire responses about the amount of time spent on instructional activities were not supported by their log diaries, teachers generally reported more time on the survey. In ten of the twelve teacher activities, a higher percentage of teachers overreported allocated time than underreported. The majority of teachers underreported on the questionnaire—relative to the logs—the amount of time spent on two teacher activities: stimulating student discussions of multiple approaches and leading students in recitation or drill exercises. Teachers spent more time on those activities during the four case study weeks than they indicated on the questionnaire.

It may well be that social desirability acts as a bias to create some of these patterns. When removed from the immediate experience of teaching, respondents tended to remember using more practices that are consistent with well promoted NCTM standards and fewer traditional practices. Likewise, they tend to down-play time spent on "administrivia." On logs, the immediacy of experience corrects for these tendencies.

Consistency of data on student learning activities. Item 15 provides information on the frequency and duration of specific student instructional events. Responses from the case study questionnaires show five prominent student activities that occur frequently: listen to or observe the teacher, correct or review previous day's homework, work individually on exercises, work on assignments due as homework the next day, and wait for completion of nonacademic tasks. Similarly, questionnaire responses indicate that several other student activities happen seldom: writing a report, conducting lab or field work, giving oral reports, and working on week-long assignments. These and two other events (structured cooperative learning activities and taking tests or quizzes) occurred too rarely during the case study observations to include in our analyses comparing teacher and observer responses.

Comparing case study teachers' and independent observers' recordings of student classroom activities indicates a fairly solid level of agreement between teachers and observers on whether or not specific classroom activities occurred. Teachers and observers agreed on 82.4 percent of all student activities during the observed lessons, and the level of agreement between teachers and observers about whether the activity occurred was 75 percent or greater in 13 of the 18 student activities.

Student activities with high rates of agreement in observer and teacher records are: listen to the teacher (100 percent); work individually on exercises, etc. (92.7 percent); work in small groups (92.7 percent); and work on assignments due the next day (85.4 percent). Student activities with the lowest agreement between teacher and observer were the following: participate in whole-class discussion (56.1 percent); practice or drill on computational skills (63.4 percent); wait for completion of nonacademic tasks, e.g., attendance, homework collection, behavior management, etc. (70.7 percent); solve problems for which there are several appropriate answers or approaches (70.7 percent); and correct or review previous day's homework (73.2 percent).

Teachers and observers reported differences of opinion on what constituted the first three activities: whole-class discussions; problems for which there are several appropriate answers or approaches; and whether students were waiting or were gainfully employed. In the majority of nonagreements, teachers indicated that student discussions involved the whole class, while observers were more likely to say that only a few students were actively involved. Teachers more often said after class that problems had several approaches, when observers saw a single one emphasized.

When teachers and observers did not agree on whether students responded orally to open-ended questions or explained to the whole class solutions developed individually or in small groups, observers were more likely than teachers to indicate that those activities occurred. In all other instances of nonagreement, teachers were more likely than observers to have indicated the event occurred.

There was a high level of agreement—from 85.7 to 100 percent—between teachers and observers on the length of time each student activity occurred during the observed class. There was no pattern in the direction of nonagreement: teachers over- and under-estimated nearly equally, relative to observers' estimates.

We also measured the consistency of teachers' survey responses about the frequency of student learning activities with their summed daily log entries from the four-week case

study. The levels of agreement ranged from 46.2 to 100 percent, and averaged 69.1 percent across all responses. Agreement was greater than 75 percent for 11 of the 24 activities, and the highest agreement was for lecturing. Two items had agreement rates less than 50 percent: 46.2 percent for practice or drill on computational skills and 47.5 percent for using supplementary printed materials.

For those questionnaire responses about the frequency of student activities that were not confirmed by teacher classroom log form tallies, we also examined the direction of the nonagreeing responses. For each of 13 student activities, the majority of the teachers whose log accounts did not reflect their questionnaire responses underreported on questionnaires the frequency with which their students participated in those instructional activities. In only four of the student activities listed did more teachers overreport the frequency with which their students engaged in those activities: (1) correct or review previous day's homework; (2) respond orally to questions testing recall; (3) respond orally to open-ended questions; and (4) wait for completion of nonacademic tasks.

Similarly, we used the case study log forms to evaluate the accuracy with which teachers estimated the length of time students spent on certain learning activities. For 11 activities, 75 percent or more of teachers' estimates of time were accurate within one response category of the times indicated on their classroom logs. At least 90 percent of teachers' responses were accurate at that level for eight of those activities. For three activities, the majority of teachers whose questionnaire responses did not accurately reflect the duration indicated on their log forms were more likely to overreport on questionnaires the amount of time they allocated to those student activities. The activities were: giving oral reports, using supplementary printed materials, and engaging in on-task discussion with other students. This suggests that these activities may occur for shorter periods of time than questionnaire responses might indicate, in any case, they occupied less time in the log period than estimated for the semester.

Teachers may be more accurate in reflecting the time spent on the student activities that they use more often and less accurate estimating time spent on activities they use less frequently. For example, case study teachers indicated that students listened to them lecture during 90.6 of the 700 lessons for which we have logs, and the questionnaire responses on time per typical use accurately reflected the duration of those events within one response category for 95.1 percent of the teachers. On the other hand, case study teachers had students use textbooks for reading or reference during only 27.7 percent of the classes and only 48.8 percent of the questionnaire responses on time per typical use accurately reflected the duration of those events within one response category.

Reliability of items on instruction. Ten of the twelve subitems in Item 13 assessing the frequency with which teachers employ certain instructional techniques showed high correspondence between teachers' responses on the first and second questionnaire. Additionally, all 12 of the responses in Item 13 on the typical length of time spent per class period emphasizing each dimension had more than 75 percent agreement within one response category. Two items had low rates of agreement between the first and second questionnaires: leading students in recitation and drills and teacher time spent working on administrative tasks.

Of the 24 subitems in Item 15 assessing the frequency with which teachers have students engage in particular learning activities, 22 showed high correspondence between teachers' responses on the two questionnaires. All 24 time per typical use items had a greater than 75 percent agreement within one response category. The two items with low rates of agreement between questionnaire 1 and questionnaire 2 were (a) solving problems with more than one appropriate solution and (b) practice or drill on computational skills.

Nine of the ten subitems in Item 17 on student demonstration of mathematics competencies had high reliability between the two case study teacher questionnaires, while only 70.6 percent of responding case study teachers were consistent in their two responses to subitem 17i, generalizing from patterns or examples. This may suggest that teachers are less certain about how frequently they have students demonstrate this particular competency.

Items Assessing Availability and Use of Instructional Materials

Two items collected information about the availability of various materials and equipment classroom instruction. Those items were:

18. Teacher materials
19. Student materials

Response rates. Only a single subitem on the availability and use of materials had a relatively low mail questionnaire response rate. Item 19f on the availability to students of film or videotape had an item response rate of 95.6 percent, primarily due to missing responses. The response rate on the parallel teacher Item (18f) was 97.3 percent.

Distribution of responses. Questionnaire responses to a number of items in this section are skewed, reflecting substantial availability of certain materials for both teachers and students. More than 70 percent of all respondents say that the following materials are readily available to them and to their students: a board; graph paper; protractors, rulers, or compasses; appropriate calculator; and an overhead projector. Eighty-four percent of teachers report using the board more than once a week. Seventy-three percent of teachers report that they and their students use an appropriate calculator more than once a week. The numbers seem to reflect accurately the availability and use of these particular materials in the classrooms we observed.

Consistency of data on availability and use of instructional materials. Responses from the case study questionnaires indicate that teachers routinely and frequently use three types of materials in class: the board, an appropriate calculator, and to a lesser extent, an overhead projector. Responses also indicate relatively rare use by teachers of film or videotape, computers, graph paper, protractors or rulers, and manipulatives or models. Based on lack of use during the observed classes, we eliminated each of these except manipulatives and models from our analyses comparing teacher and observer responses. Similarly, case study questionnaire data indicate that students make frequent use of calculators, and to a lesser extent, the board and graph paper, and rare use of film or videotape, computers, manipulatives or models, and overhead projectors. Accordingly, we removed all four from the analyses.

Case study information is similar to that from questionnaires on the availability of the materials identified above. We compared the case study teachers' and observers' responses on materials to determine their level of agreement. The board, a calculator, overhead projector, and manipulatives were used by the teacher in nearly every class, while they rarely used graph paper, protractors, rulers, compasses, film or videotapes, or computers. Student use of materials was similarly narrow, but included graph paper, protractors, rulers, or compasses in addition to an appropriate calculator and the board.

The teacher and observer records indicate a high level of agreement on the use of all materials by teachers and students. At rates greater than 80 percent for all types of materials, teachers and observers agreed on whether or not teachers and students used the materials. In the relatively few cases of nonagreement, teachers were more likely than observers to say that certain materials had been used during the lesson.

Teachers and observers also had high levels of agreement on the length of time with which those materials were used during the observed lessons. With one exception, the two

groups agreed on the length of time within one response category more than 75 percent of the time. In 29 percent of the observations, teachers and observers disagreed over the length of time that teachers used a calculator during class, with most teachers indicating they used the calculator for a longer period of time than observers noted. Later discussions between teachers and observers suggested that observers took a more literal view of the amount of time that teachers used a calculator, compared to the teacher's view of continual, but sporadic use throughout the period.

To measure the reliability of questionnaire items assessing the frequency with which teachers and students used instructional materials, we compared case study teacher questionnaire responses with that teacher's log entries. For teacher use of the materials, the levels of agreement ranged from 62.5 percent to 87.2 percent and the single item with a rate of agreement less than 75 percent was for calculator use. When a teacher's questionnaire response and log entries did not agree, teachers tended to overreport on the questionnaire their use of the board and calculator, and underreport their use of an overhead projector and manipulatives.

The levels of agreement between teacher questionnaire responses and log entries for student use of materials ranged from 52.6 percent to 75.0 percent and was less than 75 percent for three materials: the board; graph paper; and protractors, rulers, and compasses. More teachers tended to underreport on the questionnaire student use of the board; graph paper; and protractors, rulers, and compasses, and overreport student use of calculators.

Reliability of items on instructional resources. All of the eight subitems on teacher materials and on student materials showed very high agreement between the first and second questionnaires on both availability and frequency of use.

Conclusions

This fieldtest used mail survey responses and data from case studies with observers and teacher-completed classroom logs to assess the validity and reliability of teacher responses to survey items about the mathematics instructional practices commonly used in eighth to twelfth grades. We report conclusions drawn from that information about the reliability and accuracy of the data collected through the fieldtested items, the potential for large-scale use of the items and methods, and their applicability to other high-interest content areas.

Accuracy of Teachers' Descriptions of Daily Teaching

Case study teachers' questionnaire responses on the student learning objectives, teacher actions, and student activities occurring and the instructional materials being used in the teachers' designated classes were substantially confirmed by independent observers in 32 of 41 items on the teacher questionnaire. Observers substantially agreed with case study teacher responses to seven of the eight items describing teachers' instructional actions, 13 of the 18 items describing student activities, and four of the seven items detailing student learning objectives. Classroom observations supported teacher responses to four items on teacher materials and to four items on student materials. Where there was nonagreement between case study teachers and observers on whether or not certain student learning objectives and instructional practices occurred, case study teachers tended to indicate more often that an event had occurred when an observer did not see it. This was also true for the nonagreements occurring in 15 of the 18 student activities.

The extent to which case study teachers and observers agreed on whether or not an event occurred depended to a large extent on the degree to which the activity was clearly defined, discrete and distinct from the other activities, and observable by an outsider. Of all the teacher activities included in Item 13, for example, subitem j ("stimulate student discussions of approaches to solving problems, explanations of their mathematical thinking, or open-ended questions") was arguably the least defined and most difficult to observe. Also, noteworthy in this respect are the terms "student discussions" and "mathematical thinking." Teachers and observers alike expressed difficulty (1) deciding whether one or two students describing their solutions to a problem, for example, constituted a "student discussion;" (2) determining how many students were needed and for what period of time before classroom discourse could be labeled a student discussion; or (3) deciding when a description of the process a student followed to arrive at an answer became an "explanation of their mathematical thinking." Not surprisingly, then, the highest reliabilities between case study teachers and observers occurred with items listing observable, discrete events. Teacher responses to items on unobservable events may be no less valid, but their reliability is much harder to document through observation.

Case study teachers' questionnaire responses on the length of time during which (1) student learning objectives were taught, (2) teachers and students engaged in activities, and (3) student and teacher materials were used in the teachers' designated classes agreed with descriptions of independent observers in 40 of 41 items on the teacher questionnaire. Observers substantially agreed with

case study teachers' description of the durations of each of the seven items detailing student learning objectives, the eight items describing teachers' instructional actions, and the 18 student activities, and on three of the four uses of teacher materials. Observers also validated teacher responses on the length of time that three teacher material items were used and on the length of time students used the materials identified in the items on student materials. Teachers were most consistent in estimating the amount of time they spent on those activities they used frequently. This may indicate that teachers are consistent in the amount of time they spend on these frequently-used activities and therefore better able to estimate time accurately. Where there was no agreement on how long a particular objective or activity occurred, teachers were just as likely as observers to underestimate an event's elapsed time. This was true for all five types of items.

Accuracy of Teachers' Descriptions of Teaching Over a Semester

Case study teachers' questionnaire responses on the student learning objectives, teacher and student activities, and the instructional materials being used in the designated classes were not supported by data they collected in four weeks of classroom logs in 37 of 61 items on the teacher questionnaire. Where the teachers' questionnaire responses did not agree with their log recordings on whether an objective or activity had occurred, teachers were more likely to underreport that an event had occurred.

This suggests that some teacher and student activities may actually occur more frequently than survey results indicate. This is as true for such methods as recitation and drill as for student discussion of multiple approaches to problem solving. Case study teachers in the sample, however, tended to report more on the teacher questionnaire than on the logs occurrence of three NCTM recommended instructional activities: demonstrating concepts using two- or three-dimensional graphics, demonstrating uses of technology, and using cooperative learning activities. This suggests the possibility of bias in the direction of social desirability.

Case study teachers' questionnaire responses on the duration of events in the teachers' designated classes were substantially validated by classroom logs in 17 of 36 items on the teacher questionnaire. Case study teachers' description of the durations of 6 of the 12 items detailing teacher instructional activities, and on 11 of the 24 items describing student activities were borne out by the event information recorded on the classroom log forms. Where there was no agreement on how long a particular objective

or activity occurred, teachers tended to overreport on questionnaires the duration of an event. This was true for most teacher and student activities.

Some items may have low agreement between teacher and observers because classroom observation is limited in its capacity to capture certain elements of classroom instruction. Using classroom observations to validate self reports of teacher practice is limited, quite simply, by the degree to which the report or activity can be detected and observed by someone else. Some instructional practice items lend themselves more readily to observation than others. Observers in this fieldtest found it particularly difficult to identify certain student learning objectives. This could happen for a number of reasons. Although the teacher may have intended a particular objective to be part of a lesson, the actualization of that objective may not have occurred or may not have been clear to the observer (and perhaps the students). We could not determine the proportion of item inconsistency caused by misleading item construction compared to that resulting from ineffective teaching.

The validation of other items may be affected by the respondent's perception of the social desirability of certain actions being described. Subtle or not-so subtle pressures may influence teachers' responses to questionnaire items that may be politically sensitive, especially those perceived to be particularly old fashioned or more or less desirable in a climate of reform. Teacher responses to two items about traditional practices, for example, may reflect the influence of social desirability: (13d) lead students in recitation, drills, or question-and-answer sessions, and (13h) work on administrative tasks, such as recordkeeping, while students work on assignments. Each has reasonably high use on the observation logs, high teacher/observer agreement on that use, and substantial use during the case study period, but low correspondence between questionnaire responses and the summed daily logs and between the first and second questionnaires.

Item		Percent Use		Percentage Agreement Between Data Sources		
		On observation logs	On case study logs	Teacher: Observer	Questionnaire: logs	Questionnaire 1: Questionnaire 2
13d	Lead students in recitation, drills, or question-and-answer sessions	76.8	50.4	75.0	48.7	70.0
13h	Work on administrative tasks, such as record keeping, while students work on assignments	64.6	52.9	87.5	28.2	68.4

Reliability of the Data

Case study teachers' responses were substantially the same on 89 percent of the questionnaire items on questionnaires completed six weeks apart. Half of the items that differed were open-ended questions requiring responses in a percent format. Case study teachers' responses on two questionnaires completed five to six weeks apart substantially validated each other in 110 of the 124 items describing the context, teaching and learning conditions, instructional activities, and instructional materials, including 57 of the 61 items that were the primary focus of the case study. Teacher responses to a second questionnaire completed later substantially agreed with their first responses on 23 of 30 items about the teaching and learning context, on 31 of 33 items about course content, on 40 of 45 items on instruction, and on all 16 items about instructional materials.

Potential for Large-scale Use

The instructional practice items that hold the most promise for large-scale use are those that have a clear and understandable definition and clearly defined limits. The challenges of creating self-report instructional practice items for large-scale use appears to be similar to the challenges that face all data collections: the best items are grounded in a clear understanding of the instructional practices in question, have distinct definitional boundaries, and have been honed through fieldtests with the broadest

possible range of potential respondents. The best items anticipate and prevent the ambiguities that might occur, for example, when teachers from one region of the country refer to a particular instructional practice with a label different from that used by teachers elsewhere, when new instructional techniques are in the midst of development and the knowledge and understanding of the techniques is not universal, or when the meaning of a common term (such as *cooperative learning*) takes on a new and narrower definition.

Parts of some items were too complex, too inclusive, or required teachers to make too-difficult distinctions in their practices, as indicated by low rates of usable responses on the mail survey.

- Low response rates to parts of Item 7 on teacher control over instruction (a) in their own classroom, and (b) through participation in decisions outside their classroom suggests problems with the item. The complex question required teachers to differentiate the extent of their control by area and by process. The layout of the item may also have contributed to a low usable response rate by requiring two responses on each line: one response in front of the item and one response following the item. Mail respondents had little problem with responses to the right of the subitems on control within the classroom, but there were fewer usable responses to left of each subitem.

- The low response rate to Item 8 on course content suggests that responding appropriately to a single open-ended item with 15 blanks over two pages is daunting even to mathematics teachers. Coupled with the item's conceptual requirements and printed density, results from this fieldtest suggest that collecting information on course content via such an open-ended item is too complex, time-consuming, and challenging.

- Inappropriate responses on Item 13i assessing the frequency with which teachers use tests and quizzes in their instructional repertoire suggests the question is too inclusive. By combining tests and quizzes in a single item, we were in effect asking teachers to ignore differences in two practices they view discretely.

High frequencies of use on some survey items suggest that either some items may need to be more narrowly defined or some practices are very pervasive in mathematics classes.

- 95.2 percent of mail questionnaire respondents and 97.6 percent of case study questionnaire respondents indicated they use the student learning objective understanding concepts, relationships, theorems (Item 10b) once a week or more. This high rate of use could suggest that the phrase is so general that it is devoid of recognizable meaning for mathematics teachers used to working with specific skills and techniques.

- Teacher responses to Item 11a indicate that 95.3 percent of mail respondents and 97.5 percent of case study teachers use items that require students to compute answers an average of once or twice per assessment. Similarly, two other items have responses that indicate that 90 percent or more of the respondents to both surveys employ those student activities more than once per week.

Response rates for items requiring two responses per line were equal to those requiring a single response. The responses to duration questions in part b provide additional information about activities employed with similar frequencies. The ability of respondents to handle two-part items requiring two responses per line had been a question in the early design phase, and results here confirm earlier fieldtest results that teachers can respond appropriately to such items. This is important since data collected through the two-part questions (for example on both the frequency and the length of time that teachers employ specific instructional techniques) provide useful information about course emphasis on topics. For example, similar high percentages of respondents to the mail questionnaire indicated their students listen to or observe teacher presentations (15a) and correct or review the previous day's homework (15h) more than once per week. However, students typically review their homework for less than ten minutes but listen to their teacher for a longer time—up to half of the period. Without that distinction in event duration, those two activities would appear equally important.

The frequency response options and time per-typical-use options collect data about traditional school schedules and block schedules equally well. Results of this fieldtest indicate that frequency response options and time per typical use options apply equally well to teachers of traditional and block scheduled classes. During earlier field trials of this instrument, we tested two different response categories at the frequent end of the response scale. "Almost every day" and "once a session or more often" on early trials gave way to "every or almost every period" on later field trials which was replaced by the current "more than 1 period per week" used on this instrument.

Our early drafts lacked suitability for schools using alternative schedules, such as block scheduling, in which classes meet for something other than five days per week.[10] At that time, some block-scheduled respondents to our early surveys steadfastly defended their

[10] Compared to a traditional schedule, block scheduled classes meet for longer periods of time at less frequent intervals. A traditionally-scheduled course might meet daily for 50 minutes; a block-scheduled course might meet every other day for 100 minutes. Overall contact hours are equal, but classes meet half as often, either two or three times per week.

inability to respond accurately to frequency options that do not relate to their schedule. Indeed, results from our early fieldtests suggested that using a conventional scale to describe block-scheduled classes confuses the meaning ascribed to response options on the high end. "Once or twice a week" could mean every class meeting for block-scheduled classes, for example, which makes the meaning of "almost every day," intended to convey more often than once or twice a week, even more ambiguous. The revised response options apply equally well to both traditional and block schedules and avoid fuzzy interpretation. And the loss in distinction between "every day" and "more than once a week" may be no loss at all; for example, Burstein et al. (1995) failed to detect significant differences between those response options.

Teachers prefer longer referent periods when responding to questions about their teaching practices. Teachers believe that longer referent periods—a semester rather than a month or a week— provide better opportunities to indicate the full extent of their instructional repertoire than shorter periods. Data from this fieldtest, however, indicate that teachers are less accurate when summarizing their practices over a semester compared to describing their instructional activities that occurred that day.

The items fieldtested in this project were developed for possible inclusion in a large survey that is mailed out over a period of time, with a potentially heavy concentration around December-January. During the project's instrument design phase, item writers and survey designers discussed the pros and cons of appropriate referent periods for the items: An accurate reflection of a semester's worth of instruction will likely yield a more balanced portrayal than a shorter one. Because teachers may go through seasonal peaks and valleys in the variety of the particular methods they employ, longer referent periods may provide a more historically accurate picture of the instructional practices.

Conversations with the teachers we observed while developing and testing the items indicate that teachers prefer longer referent periods, perceiving that they can more accurately represent their own teaching style. In discussions peppered with teacher disclaimers that the class we just sat through was not really typical because of various factors that influence the daily instructional choices teachers make, teachers said they were most comfortable responding to questionnaire items that allowed them to indicate the extent of the instructional methods and materials they use throughout the semester.

We chose the referent period for the fieldtest to address two practical concerns. First, using "the current semester" would potentially result in referent periods of different lengths, since some teachers might respond at the end of a semester while others would

complete the questionnaire at the beginning of a semester. Alternatively, using a shorter referent period, such as "the most recent two weeks," especially during that time of year would likely not be representative of teaching throughout a full semester. The final fieldtest version, therefore, asked teachers to respond to items thinking about their instructional practices within one particular course during the previous semester.

Data from items describe mathematics instructional activities generally across a semester. A final challenge in adopting these items for large-scale use is to determine the magnitude and/or scope of the large-scale data collection in which they would be used. Important considerations are the breadth of the survey topics covered, the granularity of the data collected, the amount of respondent time available, and the characteristics of the intended respondent group. The items tested in this project were intended to describe a relatively broad swath of instructional practices used by secondary mathematics teachers at a middle-level of detail and to take about 45 minutes of response time. For this purpose, the items did not ask for detailed information on each of the instructional practices that teachers use within each of several specific cognitive areas (high level of detail). Nor were they limited to responses that could be used to create generalizations across a few broad areas of mathematics instruction (low level of detail). At the level of detail fieldtested, the items as modified are most appropriate for a SASS-type questionnaire as a subset of items for a more narrowly defined group of mathematics-teaching respondents to collect information that would generally describe course content and emphasis, instructional techniques, materials, and classroom context.

Other large-scale uses are possible, but may require modification from the items included in this fieldtest. One potential use might be, for example, to collect more-detailed information on the pedagogic practices used to teach a limited number of instructional objectives. By more closely targeting potential respondents and maintaining a similar level of respondent burden, new appropriate items could be developed from the fieldtested items by combining the teacher and/or student instructional practice item(s) with each element of the items on lesson content and/or student learning objective.

Applicability to Other Content Areas

Developing applicability to instruction in other content areas and across all grade levels would potentially provide the means with which to understand better the intricacies of all K-12 instruction and clearly extend and improve the usefulness of these items and validation methods. This pilot test of instruments and methods to gather data about

classroom instructional practices was confined to mathematics classes generally available for students in eighth to twelfth grades and was not designed specifically to assess the extent to which the instrument and methods are appropriate for other disciplines. A review of the process and results obtained with eighth to twelfth grade mathematics, however, suggests some ideas about applicability of the items and methods to other content areas.

Considerations about items. Results from this fieldtest suggest no content-specific concerns that might indicate this level of data collection should be restricted to mathematics. Survey developers with an understanding of the curriculum, learning objectives, and practices of other content areas should be able to adapt these of similar items to other content areas of interest.

To a large extent, measuring and obtaining a high degree of reliability and validity of individual instructional practices items depends on the degree to which: (1) the items are appropriately specific, narrowly defined, and unambiguous; (2) teachers' conceptions of their practices are sufficiently consistent over time; (3) the terms and language in each item are understood in a uniform way by respondents and analysts; and (4) the concept or activity is observable by an outsider not directly involved in the classroom activity.

The instructional practice items that showed consistent results over repeated measurements, as determined by comparing teacher responses to the first and second questionnaire, suggest first that those items provoked the same defined picture of a specific activity and that definition was sustained by the teacher over the period of time between the first and second administration of the questionnaire. Items with broader definitions may suggest different activities to teachers during repeated readings and may result in different responses by the teacher, leading to low reliability. Second, consistent repeated responses require that the teachers' own understanding and thinking about the practices used in their classrooms are sufficiently, strong, well-defined, and unwavering between the two administrations that the match between the item and their practice remains constant. Different conceptualizations would surely lead to different responses. Third, the terminology used to construct each item must convey an identical thought to both survey respondents and data analysts. If each group does not understand the item in the same way, the resulting interpretation may be incorrect or misleading. Finally, measuring the validity of items using classroom observers to understand teacher reports of classroom activity depends to a great extent on the degree to which an event is observable by someone other than the teacher. As stated earlier, assessing the validity of teachers' responses to items on intended learning objectives for students during the observed class for this study was most problematic for objectives that were unobservable unless specifically

demonstrated. The structure of the teacher/observer relationship was designed such that the observer was not told before the observed class the content of the main student learning objectives that would be emphasized during that class. To determine the lesson objectives, the observer had to rely on observing the teacher and the students and listening to their communication. Some teachers were better than others in explicitly telling students the day's learning objectives at the beginning of the class or as the lesson proceeded. As a result, the student learning objectives with the lowest levels of agreement between teacher and observer were those that were essentially unobservable or that required that the observer have knowledge about prior learning experiences (for example whether or not the structure of the story problems was unfamiliar to students).

Considerations about validation methods. Both logs and surveys suffer from the inherent biases associated with all self-reporting, but we based our second comparisons on the log recordings for three reasons. First, because the logs were completed daily about activities occurring within the last eight hours, they are likely to be less susceptible to memory faults than retrospectively recording a full semester's activities at a single sitting. Second, if teachers do have a particular shading they wish to cast on any recording of their activities, the temptation is likely to be greatest with responses that represent activities from a full semester rather than responses that represent activities from a single day. Third, our objective was to determine the validity of items on the questionnaire, using log data as a primary source of validating information.

Using classroom log accounts of instructional activities is an accepted method of validating the reliability of teacher questionnaire responses, but the results should be interpreted cautiously given the organic limitations of the method. In this study, case study teachers kept classroom logs for at least four weeks of classes during the middle to end of the second semester of the 1996-97 school year. In the best of circumstances, the degree to which these log data can reflect the questionnaire data depends on the extent to which that four week log period was representative of the semester period covered by the questionnaires. For example, if a teacher indicates that she uses three-dimensional graphics to demonstrate a concept once or twice per month yet four weeks of daily logs show no such activity, we can not ascertain if her questionnaire response was inaccurate or whether the case study period was not reflective of her typical teaching over a longer period. Directly validating survey responses covering lengthy periods of time is a practical problem of not insubstantial proportions. Ideally, of course, one would validate questionnaire responses with daily logs over the same time period, but the heavy respondent burden to validate data collection throughout an entire semester is a strong deterrent to using that method.

Recommendations

The recommendations in this section are based on our learning and experiences administering this questionnaire to approximately 300 teachers, conducting case studies with 41 teachers, and analyzing the resulting data. We use those experiences to make recommendations intended to further improve the items and the fieldtest process and to identify the items we think warrant continued use to collect information that will enlighten our understanding of the design, intention, and implementation of secondary classroom instruction in mathematics. The following recommendations are intended to improve the survey items and the fieldtest validation process, and to identify items to include in future data collections.

1. ***Shorten the referent period for all items to improve respondent accuracy, response validation, and ultimately the reliability of the responses themselves.*** This fieldtest collected information from teachers about their instructional activities over a semester (questionnaire), daily over four weeks (logs), and following an observed class (daily log). While teachers may have different motivations to respond accurately to each type of data collection, information obtained in teacher interviews and confirmed by fieldtest results indicate that responses across a semester are based on general recall while responses to items about daily activities are grounded in specific recall. This fieldtest was not designed to produce data to validate questionnaire responses with semester-long referent periods, but case study teacher interviews indicate what intuition suggests: items requiring a mental tally of instructional activities over a semester are based on "best-guess" teacher recollection. When asked to recall over a semester, most teachers reported they estimated the frequency with which they use instructional activities. On the other hand, there was high agreement between teacher and observer on both the occurrence and length of time student learning objectives, teacher actions, and student activities when responses were recorded immediately following the class being described. This may be partly the effect of having an outside observer present, but the basic conclusion remains: teachers can use immediate recall to respond to questions about recent activities, but respond to longer referent items in a more general way. Shorter referent periods may be less representative of a single teacher who selectively and purposively employs a variety of instructional methods to respond to the particular mix of learning objectives throughout a semester-long course, but teachers are more likely to accurately recall the events that do occur. Compared to validating responses to semester-long referent periods, responses to items with shorter referent periods would be cheaper to design and conduct and less burdensome to validate, since field trials (and teacher burden) would be limited to the length of the referent period.

2. ***Redesign the item on course content.*** Information about the academic course content provides the context within which analysts can interpret

teachers' reported instructional practices. One major potential use of instructional practice data, for example, would be to identify systematic variation in instructional methods related to course content. Since previous work by Porter and others indicated that course titles provide little indication of course content, we attempted to collect specific information on course content to complement the data on instructional practices employed. The new version of the item we developed for this fieldtest, 15 content options over one and a half pages, was a compromise between Porter's very detailed items on course content that take multiple pages and our earlier and simpler fieldtest item of ten responses on one-half page.

The responses were disappointing. We had increased the course elements from 10 to 15 to provide cleaner distinctions among overlapping areas and included descriptions of each element to be even more explicit. While these changes may have added clarity to teachers' thinking as they responded, the increase in categories apparently made the necessary addition more complex. As reported earlier, ten percent of the responses to the course content question were unusable, primarily because they totaled something other than 100 percent. This suggests that further work is needed to find a format suitable for this use.

3. ***Change the format of open-ended items to closed-ended items with response options that reflect the range and frequency of expected data.*** Open-ended items in this questionnaire had the worst reliability of all other questions for suspected reasons that have already been described. We suspect that reliable categorical or ordinal data have more explanatory power than noisy continuous data.

4. ***Shorten the number of subitems included in four main questions and several others using validation and reliability data generated in this fieldtest.*** Most of the 19 items in this collection contained multiple subitems, some of which required two responses per subitem. The item on student activities had 24 subitems and required a total of 48 responses. In creating and including this item, as with the others, our goal was to collect information on a range of practices that would adequately describe the diversity of instruction across the country. We assured ourselves that respondent information from each subitem would be sufficiently interesting and unique as to make it important to collect and analyze. Regardless of the potential analytic value in a rich dataset, however, we created items whose sheer size may be forbidding to potential respondents. Shortening interesting items may require making hard choices, but it may generate more useful answers on Items 8 (course content), 13 (teacher activities), 14 (context factors), and 15 (student activities). Information from this fieldtest can identify subitems with responses that show less reliability than others tested and therefore could be dropped.

5. ***Develop items to elicit a finer description of classroom practice within specific instructional settings.*** We designed and fieldtested the items reported here to collect information on certain important practices

across a spectrum of instructional activities and considerations. While they paint a reasonably accurate and informative portrait of general mathematics instruction within that design, it is also possible to collect considerably finer-grained information with greater detail about specific and narrow instructional topics. Such a detailed level of data collection was not a goal of this fieldtest but is a logical extension that would considerably strengthen our understanding about teaching and learning.

For example, the items reported here collected information on the frequencies with which teachers (1) employed each of nine specific student learning objectives and (2) included each of 12 different assessment strategies. Data collection for a finer description of classroom approach might assess the frequency with which teachers employ each assessment strategy for each of the specific student learning objectives, asking for 12 responses each on nine items. Identifying the intended use of the data is extremely important in this respect since such an approach has an obvious and direct impact on respondent burden.

6. ***Explore ways to reword items that describe sensitive practices in ways that project those activities in an accurate but value-free way to reduce response bias from social or professional concerns***. Even then, treat as suspect responses on certain activities that are obviously polemic. Clearly, this is not a new recommendation and these are not new concerns. Rather it is a response to information from this fieldtest that indicates that some teachers responded to certain questions in ways that suggest those answers did not reflect their practice.

7. ***In future whole-SASS fieldtests, use revised instructional practice items that can be expected to provide the most information at the greatest level of accuracy.*** Although many of the items provide good quality information as currently written, we recommend improving (to greater or lesser extents) nearly every item fieldtested. Information from further testing can add to our knowledge base about the quality of data the items produce. In making these recommendations, we considered information from the analyses reported above, especially (1) the degree to which the fieldtest information indicated reliable agreements in the concept and length of time between the respondent and the observer or daily logs; (2) the frequency with which teachers' indicated they used certain practices or material, in conjunction with (3) the extent to which that practice is representative of reform or traditional instruction; (4) the clarity of each item's wording and the distinctiveness between like items; and (5) the extent to which certain items may show overlap or redundancy in representing certain conceptions of teaching as informed by principal components analysis or factor analysis. The chart in Appendix M summarizes the recommendations based on our overall assessment of how well each meets the above five considerations.

8. ***Design future projects with multiple methods to validate items, building on the particular characteristics and strengths of each method.*** Use observation, for example, to validate only those items that

describe events that can be seen; use artifact analysis to validate items about the frequency or content depth of supplementary materials; use interviews to understand responses on curricular decisions that cannot be observed.

9. ***Design future projects that use identical response options for the length of time options on the log sheet and on the questionnaire.*** One practical difficulty with this fieldtest was a critical difference in response options between the teacher questionnaire and the case study daily classroom log form caused when revisions to the questionnaire were not carried over to the log form. The four possible log form response options for the number of minutes that teachers (log Item 4) and students (log Item 5) spent on certain activities did not match the three possible response time options for the parallel Items (13 and 15) on the teacher questionnaire. The validation information was not lost, but the relatively straightforward validation task became more complex and required analysts to use data on the length of the class period to convert log form responses statistically to the metric used on the questionnaire item.

10. ***Design future projects to have a case study period that is consistent with the questionnaire referent period.*** The case studies were too short to validate the longest frequency response options on the teacher questionnaire. Most teacher questionnaire items asked for teachers to respond to questions thinking about their actions within a particular course over a full semester. In this fieldtest, case study teachers kept daily logs for four weeks, so the extent to which their daily log recordings could validate their questionnaire responses depended on the extent to which that particular four-week period was representative of the semester. Furthermore, only four weeks of daily log data could not be used reliably to validate those teacher questionnaire responses that indicated frequencies of "1 or 2 periods per semester (or half year)". This design limitation restricted the extent to which we could expect complete validation of any questionnaire responses that indicated infrequent use.

    The conscious decision to limit the length of the case studies in this project was driven by practical considerations, primarily cost, the degree of burden placed on participating teachers, and the practicality of maintaining enthusiasm among geographically-dispersed participants over a longer period of time. Future fieldtest designs should insist on consistency between response options and case study duration.

Understanding what happens in classrooms is fundamental to improving the education of our nation's students. Using accurate and reliable survey data to measure classroom practice can create trust that the resulting national portraits of classroom instruction are real and transferable. The results from this fieldtest provide the basis for optimism that revised survey items and validation methods can result in the means by which we can collect data to describe classroom instructional practices reliably and accurately.

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Appendix A

Classroom Instructional Processes Teacher Questionnaire

OMB No. 1850-0720: Approval Expires 12/31/99

NOTICE - This report is authorized by law (20 U.S. Code 1221e). Your answers will be kept strictly confidential. Results from this survey will appear in summary or statistical form only, so that individuals cannot be identified.

U.S. Department of Education
National Center for Education Statistics

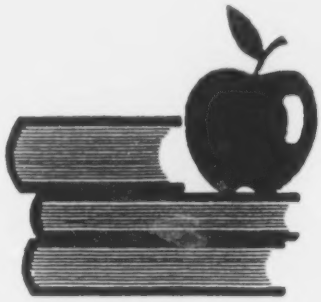
SURVEY OF CLASSROOM TEACHERS

1997

Conducted by
Policy Studies Associates

for the

National Center for Education Statistics



Classroom Instructional Processes Survey

This questionnaire asks about the instructional strategies and practices that you use in your math classroom. Its purpose is to characterize students' educational experiences and to inform the development of future national surveys of classroom processes. The rationale behind this endeavor suggests that in a learning situation the teacher's actions, the students' actions, and the instructional context--e.g., curriculum, lesson resources--contribute to learning outcomes. This questionnaire includes items that ask about these dimensions in a specific course you are now teaching.

Our long range study focuses on the instructional content and practices of math courses offered to students in grades 8-12, courses which typically cover areas from "prealgebra" through calculus. (If you do not teach any courses that mainly enroll students in these grades or at those levels, please return the survey without completing it and add a note explaining why.) When you answer the questions, think of a **single** class for which you had primary responsibility **last semester**. If you were responsible for multiple sections of one or more of the focus courses, select your first such class of the day (not homeroom), and think of this as the **designated class**. The survey begins with questions about this designated class that provide the context for your answers to later questions about instruction. We use the term "**period**" to indicate a single class meeting.

If a question is confusing, unclear, or does not seem to fit the activities in your designated class, please make an explanatory note in the margin on that page. At the conclusion of this questionnaire you will be asked to describe any sources of confusion.

The confidentiality of your responses will be protected at every stage of data collection. Formal reports and informal conversations about this task will include no reference to information that could identify participants or their schools.

I. Teaching and Learning Conditions of the School and Designated Mathematics Class

*When you answer the questions, think of a **single** class for which you had primary responsibility last **semester**. If you were responsible for multiple sections of one or more of the focus courses, select your first such class of the day (not homeroom), and think of this as the **designated class**.*

1. What is the course title? _____

2. What is the usual schedule and length (in minutes) of daily class meetings for the designated class? If the weekly schedule is normally the same, just complete Week 1.

	Week 1	Week 2	Examples		
			Wk 1	Wk 2	Wk 1
Monday	_____	_____	90	_____	45
Tuesday	_____	_____	_____	90	45
Wednesday	_____	_____	90	_____	45
Thursday	_____	_____	_____	90	45
Friday	_____	_____	90	_____	45

3. In what grade(s) are the students in your designated class enrolled? Enter the number of students at each grade level.

Ungraded	____	9th	____
6th	____	10th	____
7th	____	11th	____
8th	____	12th	____

4. Estimate the percentage of students in your designated class who function at each level of academic ability in mathematics. Use the best information you have readily available (including your own professional judgment). Percentages should total to 100%.

Much above the **SCHOOL** average	_____ %
Somewhat above the **SCHOOL** average	_____ %
At the **SCHOOL** average	_____ %
Somewhat below the **SCHOOL** average	_____ %
Much below the **SCHOOL** average	_____ %
TOTAL	100 %

5. In your opinion, what percentage of the students who enrolled in this class at the beginning are capable of learning the required material given available time and resources?

_____ percent

6. At this school, how much actual influence do you think teachers have over the following?

	No influence				Complete influence
a. Setting policy on grouping students in classes by ability	0	1	2	3	4
b. Deciding which students take which courses	0	1	2	3	4
c. Determining discipline policy within your classroom	0	1	2	3	4

7. How much control do you have over each of the following areas of planning and teaching? On the left response set, indicate how much control you have through participation or representation in department, or school, or district decision groups; on the right, indicate the control you have in your own classroom.

Through my participation in department, school, or district decisions						**In my own classroom**				
No Control				Complete Control		No Control				Complete Control
0	1	2	3	4	a. Selecting textbooks	0	1	2	3	4
0	1	2	3	4	b. Selecting instructional materials	0	1	2	3	4
0	1	2	3	4	c. Selecting content, topics and skills to be taught	0	1	2	3	4
0	1	2	3	4	d. Selecting teaching techniques	0	1	2	3	4
0	1	2	3	4	e. Determining the amount of homework to be assigned	0	1	2	3	4
0	1	2	3	4	f. Setting standards for grading in your classes	0	1	2	3	4
0	1	2	3	4	g. Disciplining students	0	1	2	3	4

II. Course Content and Emphasis

8. **Math content areas:** Estimate the percentage of time (if any) that you have spent or will spend during this course teaching each content area listed below in the designated class. The total should equal 100 percent.

Number Use/Operations
(Estimation, computational algorithms, fractions, decimals, ratio and proportion, percent, real numbers, number theory, order of operations, relationships between operations) _____%

Measurement
(Use of measuring instruments, theory [arbitrary, standard, size], conversions, metric [SI] system, length, perimeter, area, volume, surface area angles, circles [e.g., pi, radius, diameter, area], Pythagorean theorem, mass [weight], time, temperature, speed) _____%

Consumer Applications
(Simple interest, compound interest, rates [e.g., discount, commission], spread sheets) _____%

Data Analysis
(Bar graphs, histograms, pictographs, line graphs, stem and leaf plots, scatter plots, box plots, mean, median, mode, mean deviation, smoothing of graphs) _____%

Pre-Algebra
(Integers, absolute value, exponents, scientific notation, use of variables, expressions, evaluation of formulas and expressions, one-step equations, coordinate plane) _____%

Basic Algebra
(Multi-step equations, inequalities, literal equations, lines [slope and intercept], operations on polynomials, factoring, square roots and radicals, operations on radicals, rational expressions) _____%

Advanced Algebra
(Quadratic equations, systems of equations, systems of inequalities, compound inequalities, matrices [determinants], conic sections, rational, negative exponents, radicals, rules for exponents, complex numbers binomial theorem, factor [remainder theorems], field properties of real number system) _____%

Functions
(Notation, relations, linear, quadratic, polynomial, rational, logarithmic, exponential, trigonometric/circular, inverse, composition) _____%

Basic (non-measurement) Geometry
(Basic terminology, relationships between lines, angles, planes, triangles, quadrilaterals, polygons, congruence, similarity, parallels, circles, constructions) _____%

Advanced Geometry
(Logic, reasoning, proof, symmetries, loci, spheres, cones, cylinders, polyhedra, 3-dimensional relationships, transformational, coordinate, vectors, analytic, non-Euclidean, topology) _____%

[Topic list continues on next page]

8. **Math content areas (cont.):**

Trigonometry
(Basic ratios, radian measures, right triangle trigonometry, law of Sines, Cosines, identities, trigonometric equations, polar coordinates, periodicity, amplitude) _____ %

Statistics
(Variability/standard deviation, quartiles, percentiles, bivariate distributions, sampling, confluence intervals, correlation, lines of best fit, hypothesis testing, Chi-square, data transformation, central limit theorem) _____ %

Probability
(Sample spaces, compound probability, conditional probability, independent and dependent events, empirical, expected value, binomial distribution, normal curve) _____ %

Finite Math/Special Topics
(Sets, logic, mathematical induction, linear programming, networks, iteration and recursion, permutations/combinations, simulations, fractals) _____ %

Analysis
(Sequences and series, limits, continuity, rates of change, maxima, minima, differentiation, integration) _____ %

TOTAL 100 %

9. **Dimensions of math:** Math courses approach the study of skills and concepts in many ways, and material covered during a given period may include several emphases. Listed below are cross-cutting dimensions of mathematics that may be covered during any class meeting. First, please circle the response that indicates how frequently activities in the designated class emphasize each dimension. Second, circle the response that indicates about how much time you typically spend on that dimension when you do include it. (For example, if you usually open class meetings with a short, real-life application problem, you would circle 4 for "more than once a week" and a for "10 minutes or less.") Do not answer the "time" item if your "frequency" response is "never." If your school is not on semesters, answer for half a year.

		Frequency of Use					Time Per Typical Use		
		Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
Lesson content emphasis:									
a.	Computational techniques	0	1	2	3	4	a	b	c
b.	Specific math facts or definitions	0	1	2	3	4	a	b	c
c.	Broad math concepts	0	1	2	3	4	a	b	c
d.	Problem solving/inquiry skills	0	1	2	3	4	a	b	c
e.	Skill in communicating in speech or writing about mathematical ideas or applications	0	1	2	3	4	a	b	c
f.	Importance of mathematics in daily life	0	1	2	3	4	a	b	c
g.	Applications of mathematics in science	0	1	2	3	4	a	b	c
h.	Applications of mathematics in business and industry	0	1	2	3	4	a	b	c

10. **Objectives:** During the year, lessons in a course vary in the difficulty and complexity of their objectives for student learning, and in the strategies used to achieve them. Listed below are typical learning objectives. Circle the response that indicates for each objective the average frequency with which it occurs in the designated class.

	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
Student learning objective:					
a. Memorize (e.g., facts, definitions, or formulae)	0	1	2	3	4
b. Understand (e.g., concepts, relationships, theorems)	0	1	2	3	4
c. Collect data (e.g., observe, measure, count)	0	1	2	3	4
d. Order, compare, estimate, approximate	0	1	2	3	4
e. Perform mathematical operations, execute algorithms, classify	0	1	2	3	4
f. Solve "story" problems with familiar structures, replicate proofs	0	1	2	3	4
g. Recognize and solve story problems with unfamiliar or complex structures	0	1	2	3	4
h. Interpret data (e.g., charts, graphs, tables)	0	1	2	3	4
i. Build and revise theories, develop proofs	0	1	2	3	4

11. **Assessment content:** On the tests, quizzes, projects, portfolio products, and other formal assessment strategies you use in this class, how often do the following kinds of items appear?

	Never	Only during units focusing on that skill	Occasionally	Average of once per assessment	Twice or more per assessment
a. Items that require students to compute answers	0	1	2	3	4
b. Items that require students to recognize or recall definitions or concepts	0	1	2	3	4
c. Items that allow more than one solution or approach	0	1	2	3	4
d. Items that require more than one step to reach a solution	0	1	2	3	4
e. Items that require students to explain concepts in words or pictures	0	1	2	3	4
f. Items that require students to observe or measure	0	1	2	3	4
g. Items that require students to compare an estimated answer with a calculated or computed answer	0	1	2	3	4
h. Items that require the use of algorithms to solve problems	0	1	2	3	4
i. Items that require students to describe how they solved problems by showing all their work, writing explanations, or drawing pictures	0	1	2	3	4
j. Items that require students to interpret tabular or graphical data	0	1	2	3	4
k. Items that require the application of familiar concepts or principles to different or unfamiliar situations	0	1	2	3	4
l. Items that require a critique or analysis of a suggested solution to a problem	0	1	2	3	4
m. Other (specify)_____	0	1	2	3	4

12. Indicate the extent to which this course--as it is taught to the single designated class--is interdisciplinary or integrated with another course, if at all. By this we mean that certain topics are taught together to enhance the depth of both, such as combining math and science units that rely on statistical analysis or using mathematical skills to represent and understand historical or political trends. Circle the appropriate response on each line.

	Never	1 or 2 periods per semester	1 or 2 periods per month	One period per week	> 1 period per week
a. I use examples or illustrations from other subject areas in my math teaching, e.g., in "story" or other application problems.	0	1	2	3	4
b. I blend the teaching of another subject area into my math teaching in this class.	0	1	2	3	4
c. I work with teachers from one or more subject areas to integrate other subjects into my math teaching.	0	1	2	3	4

d. A subject area I use more often than others to illustrate math applications is _____

III. Instruction

13. **Teacher activity:** Different instructional strategies involve different types of teacher activity during a lesson. For each teacher activity listed below, first circle the response that indicates how often you do it with your designated class, and then circle the letter that indicates about how much total time per period you typically spend when you do it. (You may engage in more than one activity during a class session.) Do not answer the "time" item if your "frequency" response is "never."

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
a. Lecture, perhaps occasionally soliciting brief student input or using the board or overhead projector to highlight a key term or present an outline	0	1	2	3	4	a	b	c
b. Demonstrate a concept, using two-dimensional graphics such as drawings on the board, overhead projector, or computer	0	1	2	3	4	a	b	c
c. Demonstrate a concept, using three-dimensional tools such as manipulatives, models, or other objects	0	1	2	3	4	a	b	c
d. Lead students in recitation, drills, or question-and-answer sessions	0	1	2	3	4	a	b	c
e. Observe or monitor student-led whole class discussions or demonstrations related to mathematics	0	1	2	3	4	a	b	c
f. Provide individual or small group tutoring as needed during individual seatwork or small group activities involving everyone in class	0	1	2	3	4	a	b	c
g. Provide remedial or enriching instruction to a pull-out group while the rest of the class works on assignments	0	1	2	3	4	a	b	c
h. Work on administrative tasks, such as recordkeeping, while students work on assignments	0	1	2	3	4	a	b	c
i. Administer a test or a quiz	0	1	2	3	4	a	b	c
j. Stimulate student discussions of approaches to solving problems, explanations of their mathematical thinking, or open-ended questions	0	1	2	3	4	a	b	c
k. Demonstrate uses of technology in mathematics	0	1	2	3	4	a	b	c
l. Set up and monitor or supervise cooperative learning activities	0	1	2	3	4	a	b	c

14. **Context factors:** Listed below are two kinds of factors that may characterize a class and, where present, may require accommodation in instruction. The first set of factors are student characteristics that contribute to diversity. The second set are usually viewed as problematic. Both types vary quite a lot across schools, districts, and regions. For each factor, please indicate whether it is present to any degree.

	Present in Class?			
	No	Minimally	Moderately	Considerably
Student Diversity				
a. Students have very different academic abilities in this subject.	0	1	2	3
b. Students have different backgrounds, e.g., economic, language, culture.	0	1	2	3
c. Some students have special needs, e.g., physical or emotional impairment.	0	1	2	3
Problems				
d. Students are inadequately prepared for level of material.	0	1	2	3
e. Students are disinterested.	0	1	2	3
f. There are threats to students' personal safety.	0	1	2	3
g. There is a shortage of appropriate technology for student use.	0	1	2	3
h. There is a shortage of other equipment for student use.	0	1	2	3
i. Students have low morale.	0	1	2	3
j. Parents are not interested in their child's learning.	0	1	2	3
k. Family problems preoccupy students.	0	1	2	3
l. There is a shortage of appropriate technology for teacher use.	0	1	2	3
m. There is a shortage of other equipment for teacher use.	0	1	2	3
n. There is a shortage of preparation and planning time for teachers.	0	1	2	3

14. **Context factors (cont.):**

	Present in Class?			
	No	Minimally	Moderately	Considerably
Problems (cont.)				
o. There are threats to teachers' personal safety.	0	1	2	3
p. Physical facilities are inadequate.	0	1	2	3
q. Administrative support for instruction is inadequate.	0	1	2	3

15. **Student activities:** Listed below are many kinds of student lesson activities, some with a long history of use in math classes and others associated with recent reform efforts. First, scan the whole list from a to x to see the array of choices, then circle the number next to each that indicates how often--if at all--the way you teach the designated class during the regular class period requires that students engage in each activity. Do not answer the "time" item if your "frequency" response is "never."

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
a. Listen to or observe teacher presentations	0	1	2	3	4	a	b	c
b. Work individually on exercises, worksheets, or workbooks	0	1	2	3	4	a	b	c
c. Use a textbook for activities other than homework, e.g., reading or reference	0	1	2	3	4	a	b	c
d. Use supplementary printed materials	0	1	2	3	4	a	b	c
e. Participate in whole-class discussions	0	1	2	3	4	a	b	c
f. Explain how what they learn in class relates to the real world	0	1	2	3	4	a	b	c
g. Engage in on-task discussion primarily with other students	0	1	2	3	4	a	b	c
h. Correct or review previous day's homework	0	1	2	3	4	a	b	c
i. Work on projects/assignments that take a week or more to finish	0	1	2	3	4	a	b	c
j. Give or listen to other students give oral reports	0	1	2	3	4	a	b	c
k. Solve problems for which there are several appropriate answers or approaches	0	1	2	3	4	a	b	c
l. Write a report or paper	0	1	2	3	4	a	b	c

15. **Student activities (cont.):**...Indicate how often--if at all--the lesson activities you use with the designated class during the regular class period require that students:

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
m. Work in small groups	0	1	2	3	4	a	b	c
n. Do lab or field work	0	1	2	3	4	a	b	c
o. Evaluate other students' work	0	1	2	3	4	a	b	c
p. Practice or drill on computational skills	0	1	2	3	4	a	b	c
q. Work on assignments that will be due as homework on the next day	0	1	2	3	4	a	b	c
r. Respond orally to questions testing recall	0	1	2	3	4	a	b	c
s. Respond orally to open-ended questions	0	1	2	3	4	a	b	c
t. Take notes	0	1	2	3	4	a	b	c
u. Explain to the whole class solutions developed individually or in small groups	0	1	2	3	4	a	b	c
v. Participate in structured cooperative learning activities	0	1	2	3	4	a	b	c
w. Take tests, quizzes, other assessments	0	1	2	3	4	a	b	c
x. Wait for completion of non-academic tasks, e.g., attendance, homework collection, behavior management, etc.	0	1	2	3	4	a	b	c

16. **Non-academic time:** How many minutes during each meeting of your designated class do you typically spend on activities not directly related to the academic content of this course? (Examples: listening to or making announcements, taking attendance, establishing rapport, or handling disruptions.)

_____ minutes

17. **Demonstrating math competencies:** As a result of successful study, students are able to demonstrate proficiency in tasks of different levels of difficulty and complexity. In the designated class, how often do students have formal or informal opportunities to demonstrate the following competencies? Circle one response on each line.

	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
a. Memorize basic number facts or formulae	0	1	2	3	4
b. Understand a math concept	0	1	2	3	4
c. Collect original data	0	1	2	3	4
d. Organize, summarize, or display information	0	1	2	3	4
e. Use estimation to determine the reasonableness of results	0	1	2	3	4
f. Perform computations using basic number facts	0	1	2	3	4
g. Use algebraic or geometric reasoning strategies to solve problems	0	1	2	3	4
h. Analyze and interpret information	0	1	2	3	4
i. Generalize from patterns or examples	0	1	2	3	4
j. Generate original examples	0	1	2	3	4

IV. Materials

18. **Teacher materials:** Indicate the extent to which the materials and equipment listed below are available, and the frequency with which you use them to teach your designated class. Indicate frequency of use only if the item was available. (Note, a separate item will ask how often students use them.)

0 = The item was not available
1 = Item was available in limited supply or with limited functions so that use was less effective than it could have been.
2 = Item was available in adequate supply and/or with appropriate functions for most effective use.

	Availability			Frequency of Use				
	Not available	Limited availability	Full availability	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
a. Board	0	1	2	0	1	2	3	4
b. Graph paper	0	1	2	0	1	2	3	4
c. Protractors, rulers, or compasses	0	1	2	0	1	2	3	4
d. Appropriate calculator	0	1	2	0	1	2	3	4
e. Overhead projector	0	1	2	0	1	2	3	4
f. Film or videotape	0	1	2	0	1	2	3	4
g. Computer or computer programs	0	1	2	0	1	2	3	4
h. Manipulatives, models, or other objects	0	1	2	0	1	2	3	4
i. Other (specify) _____	0	1	2	0	1	2	3	4

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19. **Student materials:** Indicate the extent to which materials and equipment listed below are available, and the frequency with which <u>students</u> in your <u>designated class</u> use them during a regular class period. Indicate frequency of use <u>only</u> if the item was available.

0 = The item was <u>not available</u>
1 = Item was available in limited supply or with limited functions so that use was less effective than it could have been.
2 = Item was available in adequate supply and/or with appropriate functions for most effective use.

	Availability			Frequency of Use				
	Not Available	Limited Availability	Full Availability	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
a. Board	0	1	2	0	1	2	3	4
b. Graph paper	0	1	2	0	1	2	3	4
c. Protractors, rulers, or compasses	0	1	2	0	1	2	3	4
d. Appropriate calculator	0	1	2	0	1	2	3	4
e. Overhead projector	0	1	2	0	1	2	3	4
f. Film or videotape	0	1	2	0	1	2	3	4
g. Computer or computer programs	0	1	2	0	1	2	3	4
h. Manipulatives, models, or other objects	0	1	2	0	1	2	3	4
i. Other (specify) _____	0	1	2	0	1	2	3	4

The following items concern the questionnaire itself. Information you provide will help us improve the questionnaire for future use.

20. Were any of the questions confusing or unclear?

_____ No

_____ Yes If yes, please list the question number and describe the source of confusion.

Number	*Source of confusion*
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

21. Use the space below to describe any other problems or make any recommendations about the questionnaire.

_____

_____

_____

_____

_____

Please remember to note the time you finish and record the total time you spent on this survey on the front page. Thank you again for your help.

Appendix B

Fieldtest Sample and Response

Appendix B

Mail Survey Fieldtest Sample

	Number	Percent of all surveys mailed	Percent of all in scope surveys
Total surveys mailed			
Public school teachers	264	63	
Private school teachers	154	37	
Total	418	100	
Out of scope			
Does not teach math	18		
On leave	3		
Total	21	5	
Total in scope	397	95	100
Refused	13	3	3
Completed and returned			
Public school teachers	191	46	48
Private school teachers	105	25	26
Total	296	71	75
Not returned	88	21	22

Total Schools	Invited	Participated
Public Schools	87	76
Private Schools	77	64

Appendix C

Instructional Processes Daily Classroom Log

DAILY LOG

Today's Date: _____

Name: _____ School: _____

Course/subject: _____ Scheduled length of period: _____ minutes Time spent on nonacademic activities: _____ minutes

1. Briefly describe the content and structure of today's lesson, including the most important skills or knowledge that you wanted the students to learn. (*Please attach handouts, worksheets, tests, etc., that help show what this lesson was about.*)

2. After each general type of student learning objective, circle the number that indicates its importance in today's lesson (if it played any role at all).

Minutes Spent:	None	<10	10-30	30-45	>45
a. Memorize facts, definitions, or equations	0	1	2	3	4
b. Understand concepts	0	1	2	3	4
c. Collect data by observing or measuring	0	1	2	3	4
d. Order, compare, estimate, approximate	0	1	2	3	4
e. Perform mathematical procedures	0	1	2	3	4

Minutes Spent:	None	<10	10-30	30-45	>45
f. Solve problems, replicate proofs	0	1	2	3	4
g. Recognize and solve unfamiliar problems	0	1	2	3	4
h. Create or interpret data in charts, tables	0	1	2	3	4
i. Build and revise theories, develop proofs	0	1	2	3	4

3. Circle the numbers that show the extent to which you and the students used the following materials and equipment during this class period, then circle the letters to show their importance to the lesson.

A = Item was not necessary to achieve today's learning objectives C = Item was essential in achieving today's learning objectives
B = Item was helpful in achieving today's learning objectives

	Teacher Use								Student Use							
	Extent of Use (in minutes)					Importance			Extent of Use (in minutes)					Importance		
	None	<10	10-30	30-45	>45	Not Nec.	Help ful	Essti.	None	<10	10-30	30-45	>45	Not Nec.	Help ful	Essti.
a. Overhead projector	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
b. Chalkboard	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
c. Graph paper	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
d. Appropriate calculator	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
e. Protractor, compass, ruler, etc.	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
f. Film or videotape equipment	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
g. Computers/software	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
h. Manipulative, models, objects	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C
C. Other (indicate)	0	1	2	3	4	A	B	C	0	1	2	3	4	A	B	C

_____

4. What did you do during this period? For all that apply, circle the approximate time spent on each teacher activity.

Minutes Spent:	None	<10	10-30	30-45	>45
a. Present or explain, using the board or overhead for key terms or outline	0	1	2	3	4
b. Demonstrate a concept, using two-dimensional graphics	0	1	2	3	4
c. Demonstrate a concept, using three-dimensional graphics	0	1	2	3	4
d. Lead students in discussion, recitation, or drills	0	1	2	3	4
e. Observe or monitor student-led discussions	0	1	2	3	4
f. Provide individual or small group tutoring during seatwork	0	1	2	3	4
g. Provide supplemental instruction to a pull-out group	0	1	2	3	4
h. Work on administrative tasks, checking papers, recordkeeping, etc....	0	1	2	3	4
i. Administer a test or a quiz	0	1	2	3	4
j. Stimulate class discussion of multiple approaches, mathematical thinking, etc....	0	1	2	3	4
k. Demonstrate uses of technology in mathematics	0	1	2	3	4
l. Set up and monitor/supervise cooperative learning activities	0	1	2	3	4

5. What did the students do during today's lesson? For all that apply, circle the approximate time spent on each student activity.

Minutes Spent:	None	<10	10-30	30-45	>45
a. Listen to or observe the teacher	0	1	2	3	4
b. Work individually on exercises, worksheets, or workbooks	0	1	2	3	4
c. Use text for activities besides homework	0	1	2	3	4
d. Use supplementary printed materials	0	1	2	3	4
e. Participate in whole-class discussion	0	1	2	3	4
f. Explain how lessons relate to real world	0	1	2	3	4
g. Discuss lesson mostly with students	0	1	2	3	4
h. Review previous day's homework	0	1	2	3	4
i. Work on long-term projects	0	1	2	3	4
j. Give oral reports	0	1	2	3	4
k. Solve problems that have several appropriate answers or approaches	0	1	2	3	4
l. Write a report or paper	0	1	2	3	4

Minutes Spent:	None	<10	10-30	30-45	>45
m. Work in small groups	0	1	2	3	4
n. Do lab or field work	0	1	2	3	4
o. Evaluate other students' work	0	1	2	3	4
p. Practice or drill on computational skills	0	1	2	3	4
q. Work on assignments due next day	0	1	2	3	4
r. Respond orally to questions testing recall	0	1	2	3	4
s. Respond orally to open-ended questions	0	1	2	3	4
t. Take notes	0	1	2	3	4
u. Explain to the whole class solutions developed individually or in small groups	0	1	2	3	4
v. Participate in structured cooperative learning activities	0	1	2	3	4
w. Take tests, quizzes, other assessments	0	1	2	3	4
x. Wait for completion of tasks such as homework collection or attendance	0	1	2	3	4

6. Lesson structure. Use activities a - x in item 5 to sketch the structure of this lesson as most students experienced it. Next to the number showing order of events write the letter of the student activity and the approximate number of minutes students were engaged in each. If different student groups worked on different task sequences, choose the largest group for your response.

Order	Activity	Duration	Order	Activity	Duration
1	_____	_____	5	_____	_____
2	_____	_____	6	_____	_____
3	_____	_____	7	_____	_____
4	_____	_____	8	_____	_____

7. Is there anything else you want to add? What did you do that doesn't fit in the above questions?

Appendix D

Mail Questionnaire Item Response Rates and Item Use Rates

Appendix D

Mail Questionnaire Item Response Rates*

Item Number		Item Response Rate	Item Use Rate
(a)		(b)	(c)
1		97.3	
2		100.0	
3		88.2	
4		97.0	
5		99.3	
6	a	99.0	
	b	98.6	
	c	98.6	
7	a1	95.3	
	b1	94.3	
	c1	93.9	
	d1	94.3	
	e1	93.2	
	f1	94.6	
	g1	94.6	
	a2	97.6	
	b2	98.3	
	c2	99.3	
	d2	99.7	
	e2	99.3	
	f2	99.3	
	g2	99.3	
8		89.5	
	a		81.8
	b		81.1
	c		58.8
	d		66.9
	e		82.1
	f		86.5
	g		61.5
	h		57.1
	i		65.5
	j		38.2
	k		46.6
	l		27.0
	m		42.6
	n		28.0
	o		27.0
9	a1	97.0	95.3
	b1	97.3	96.3
	c1	95.9	94.9
	d1	98.3	98.3
	e1	97.0	86.5
	f1	98.0	97.0

* See Appendix K for formulas used in calculations.

Appendix D

Mail Questionnaire Item Response Rates*

Item Number		Item Response Rate	Item Use Rate
	(a)	(b)	(c)
	g1	97.6	93.2
	h1	97.6	92.6
9	a2	98.9	
	b2	99.3	
	c2	99.3	
	d2	98.6	
	e2	99.6	
	f2	99.3	
	g2	100.0	
	h2	99.3	
10	a	99.3	93.9
	b	98.6	98.6
	c	99.3	88.2
	d	97.3	93.9
	e	99.3	98.6
	f	99.7	98.0
	g	99.0	93.2
	h	99.0	93.6
	i	98.6	69.6
11	a	100.0	100.0
	b	99.7	99.7
	c	99.3	97.6
	d	99.7	99.7
	e	99.3	91.9
	f	99.7	87.5
	g	99.3	89.9
	h	98.6	90.9
	i	99.7	98.0
	j	99.3	90.2
	k	99.3	95.3
	l	99.0	70.9
12	a	99.0	94.9
	b	100.0	80.1
	c	99.7	49.7
13	a1	99.3	96.6
	b1	99.3	98.6
	c1	99.3	91.9
	d1	99.0	86.1
	e1	98.6	73.0
	f1	99.7	97.0
	g1	98.6	67.9
	h1	98.6	56.8
	i1	99.0	99.0
	j1	97.6	96.3

* See Appendix K for formulas used in calculations.

Appendix D

Mail Questionnaire Item Response Rates*

Item Number		Item Response Rate	Item Use Rate
	(a)	(b)	(c)
	k1	99.3	91.6
	l1	99.3	86.8
13	a2	98.6	
	b2	98.3	
	c2	98.2	
	d2	98.0	
	e2	99.5	
	f2	98.3	
	g2	99.0	
	h2	97.6	
	i2	95.9	
	j2	97.2	
	k2	98.5	
	l2	97.7	
14	a	99.7	
	b	100.0	
	c	100.0	
	d	99.7	
	e	99.7	
	f	100.0	
	g	99.7	
	h	99.3	
	i	99.7	
	j	100.0	
	k	100.0	
	l	99.7	
	m	99.7	
	n	99.3	
	o	100.0	
	p	99.7	
	q	99.7	
15	a1	100.0	97.0
	b1	99.7	95.9
	c1	98.6	79.4
	d1	99.3	94.9
	e1	99.7	97.6
	f1	99.3	91.6
	g1	99.3	93.6
	h1	100.0	98.0
	i1	99.0	57.4
	j1	99.7	41.2
	k1	99.3	95.6
	l1	99.7	39.2
	m1	99.7	96.3

* See Appendix K for formulas used in calculations.

Appendix D

Mail Questionnaire Item Response Rates*

Item Number		Item Response Rate	Item Use Rate
	(a)	(b)	(c)
	n1	98.3	42.2
	o1	99.0	60.8
	p1	97.6	81.1
	q1	99.3	92.6
	r1	99.0	95.9
	s1	97.6	91.2
	t1	99.3	95.6
	u1	99.3	86.8
	v1	98.0	81.4
	w1	99.0	99.0
	x1	97.3	77.4
15	a2	98.3	
	b2	98.9	
	c2	98.3	
	d2	98.6	
	e2	99.3	
	f2	99.3	
	g2	98.9	
	h2	97.6	
	i2	97.7	
	j2	98.4	
	k2	97.9	
	l2	99.1	
	m2	97.5	
	n2	98.4	
	o2	98.3	
	p2	97.1	
	q2	98.5	
	r2	98.2	
	s2	98.5	
	t2	98.6	
	u2	97.7	
	v2	97.5	
	w2	96.6	
	x2	99.6	
16		99.0	
17	a	98.6	91.9
	b	99.3	99.3
	c	98.0	76.7
	d	99.0	91.9
	e	99.3	95.6
	f	99.3	97.0
	g	99.3	99.0
	h	99.3	98.3

* See Appendix K for formulas used in calculations.

Appendix D

Mail Questionnaire Item Response Rates*

Item Number		Item Response Rate	Item Use Rate
	(a)	(b)	(c)
	i	99.0	96.3
	j	99.0	88.5
18	a1	99.7	
	b1	98.0	
	c1	97.6	
	d1	98.3	
	e1	99.3	
	f1	97.3	
	g1	98.6	
	h1	99.0	
18	a2	100.0	98.3
	b2	99.3	88.2
	c2	98.6	77.7
	d2	99.6	87.8
	e2	99.3	76.7
	f2	99.2	35.5
	g2	98.3	39.5
	h2	99.6	70.9
19	a1	98.6	
	b1	98.6	
	c1	97.6	
	d1	98.3	
	e1	97.6	
	f1	95.6	
	g1	97.3	
	h1	98.3	
19	a2	99.3	92.2
	b2	97.9	87.8
	c2	98.6	77.0
	d2	98.9	87.8
	e2	98.0	43.6
	f2	97.5	4.4
	g2	98.6	27.7
	h2	98.8	56.4

* See Appendix K for formulas used in calculations.

Appendix E

Distribution of Mail Survey Item Responses

Mail Survey Responses (N=296)[1]

I. Teaching and Learning Conditions of the School and Designated Mathematics Class

When you answer the questions, think of a single class for which you had primary responsibility last semester. If you were responsible for multiple sections of one or more of the focus courses, select your first such class of the day (not homeroom), and think of this as the designated class.

1. What is the course title? _____

2. What is the usual schedule and length (in minutes) of daily class meetings for the designated class? If the weekly schedule is normally the same, just complete Week 1.

	Week 1	Week 2	Examples Wk 1	Examples Wk 2	Examples Wk 1
Monday			90		45
Tuesday				90	45
Wednesday			90		45
Thursday				90	45
Friday			90		45

3. In what grade(s) are the students in your designated class enrolled? Enter the number of students at each grade level.

Ungraded	____	9th	____
6th	____	10th	____
7th	____	11th	____
8th	____	12th	____

4. Estimate the percentage of students in your designated class who function at each level of academic ability in mathematics. Use the best information you have readily available (including your own professional judgment). Percentages should total to 100%.

Much above the **SCHOOL** average	26.1
Somewhat above the **SCHOOL** average	22.6
At the **SCHOOL** average	30.6
Somewhat below the **SCHOOL** average	13.1
Much below the **SCHOOL** average	7.4
TOTAL	100.0

[1] See Appendix D for mail questionnaire item response rates.

5. In your opinion, what percentage of the students who enrolled in this class at the beginning are capable of learning the required material given available time and resources?

$\bar{x}$=89.8 percent

6. At this school, how much actual influence do you think teachers have over the following?

	No influence				Complete influence
a. Setting policy on grouping students in classes by ability	14.6	16.3	21.4	31.0	23.8
b. Deciding which students take which courses	6.8	12.2	28.9	40.5	10.9
c. Determining discipline policy within your classroom	1.0	3.1	8.9	36.9	49.8

7. How much control do you have over each of the following areas of planning and teaching? On the left response set, indicate how much control you have through participation or representation in department, or school, or district decision groups; on the right, indicate the control you have in your own classroom.

Through my participation in department, school, or district decisions						In my own classroom				
No Control				Complete Control		No Control				Complete Control
10.2	8.1	22.2	40.5	18.3	a. Selecting textbooks	13.8	8.3	16.2	37.6	23.8
5.7	7.4	20.2	42.9	22.7	b. Selecting instructional materials	0.3	2.1	9.6	32.5	55.1
9.3	10.4	23.9	38.9	16.8	c. Selecting content, topics and skills to be taught	6.4	4.1	18.0	37.6	33.6
8.6	6.8	17.1	30.0	37.1	d. Selecting teaching techniques	0.0	0.3	2.7	16.9	80.0
10.5	6.1	18.4	27.8	36.8	e. Determining the amount of homework to be assigned	0.3	0.7	2.4	18.3	78.0
8.9	8.2	22.3	32.6	27.3	f. Setting standards for grading in your classes	0.3	1.0	7.5	27.5	63.4
9.2	11.0	25.9	33.0	20.2	g. Disciplining students	0.0	1.0	8.8	42.0	47.8

II. Course Content and Emphasis

8. **Math content areas:** Estimate the percentage of time (if any) that you have spent or will spend during this course teaching each content area listed below in the designated class. The total should equal 100 percent.

Number Use/Operations
(Estimation, computational algorithms, fractions, decimals, ratio and proportion, percent, real numbers, number theory, order of operations, relationships between operations) _____%

Measurement
(Use of measuring instruments, theory [arbitrary, standard, size], conversions, metric [SI] system, length, perimeter, area, volume, surface area angles, circles [e.g., pi, radius, diameter, area], Pythagorean theorem, mass [weight], time, temperature, speed) _____%

Consumer Applications
(Simple interest, compound interest, rates [e.g., discount, commission], spread sheets) _____%

Data Analysis
(Bar graphs, histograms, pictographs, line graphs, stem and leaf plots, scatter plots, box plots, mean, median, mode, mean deviation, smoothing of graphs) _____%

Pre-Algebra
(Integers, absolute value, exponents, scientific notation, use of variables, expressions, evaluation of formulas and expressions, one-step equations, coordinate plane) _____%

Basic Algebra
(Multi-step equations, inequalities, literal equations, lines [slope and intercept], operations on polynomials, factoring, square roots and radicals, operations on radicals, rational expressions) _____%

Advanced Algebra
(Quadratic equations, systems of equations, systems of inequalities, compound inequalities, matrices [determinants], conic sections, rational, negative exponents, radicals, rules for exponents, complex numbers binomial theorem, factor [remainder theorems], field properties of real number system) _____%

Functions
(Notation, relations, linear, quadratic, polynomial, rational, logarithmic, exponential, trigonometric/circular, inverse, composition) _____%

Basic (non-measurement) Geometry
(Basic terminology, relationships between lines, angles, planes, triangles, quadrilaterals, polygons, congruence, similarity, parallels, circles, constructions) _____%

Advanced Geometry
(Logic, reasoning, proof, symmetries, loci, spheres, cones, cylinders, polyhedra, 3-dimensional relationships, transformational, coordinate, vectors, analytic, non-Euclidean, topology) _____%

[Topic list continues on next page]

8. **Math content areas (cont.):**

Trigonometry
(Basic ratios, radian measures, right triangle trigonometry, law of Sines, Cosines, identities, trigonometric equations, polar coordinates, periodicity, amplitude) _____ %

Statistics
(Variability/standard deviation, quartiles, percentiles, bivariate distributions, sampling, confluence intervals, correlation, lines of best fit, hypothesis testing, Chi-square, data transformation, central limit theorem) _____ %

Probability
(Sample spaces, compound probability, conditional probability, independent and dependent events, empirical, expected value, binomial distribution, normal curve) _____ %

Finite Math/Special Topics
(Sets, logic, mathematical induction, linear programming, networks, iteration and recursion, permutations/combinations, simulations, fractals) _____ %

Analysis
(Sequences and series, limits, continuity, rates of change, maxima, minima, differentiation, integration) _____ %

TOTAL 100 %

9. **Dimensions of math:** Math courses approach the study of skills and concepts in many ways, and material covered during a given period may include several emphases. Listed below are cross-cutting dimensions of mathematics that may be covered during any class meeting. First, please circle the response that indicates how frequently activities in the designated class emphasize each dimension. Second, circle the response that indicates about how much time you typically spend on that dimension when you do include it. (For example, if you usually open class meetings with a short, real-life application problem, you would circle 4 for "more than once a week" and a for "10 minutes or less.") Do not answer the "time" item if your "frequency" response is "never." If your school is not on semesters, answer for half a year.

		Frequency of Use					Time Per Typical Use		
		Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
Lesson content emphasis:									
a.	Computational techniques	1.7	6.3	9.8	17.1	65.2	38.7	32.3	29.0
b.	Specific math facts or definitions	1.0	3.8	12.1	27.7	55.0	48.4	35.1	16.1
c.	Broad math concepts	1.1	4.6	21.1	33.3	39.6	35.2	39.5	24.9
d.	Problem solving/inquiry skills	0.0	1.4	11.7	33.3	53.6	17.4	39.6	42.7
e.	Skill in communicating in speech or writing about mathematical ideas or applications	10.8	23.3	30.0	19.9	16.0	47.5	37.8	14.7
f.	Importance of mathematics in daily life	1.0	13.8	32.1	29.0	24.1	64.3	26.9	8.4
g.	Applications of mathematics in science	4.5	16.3	40.1	29.4	9.7	61.6	26.8	11.6
h.	Applications of mathematics in business and industry	5.2	21.5	36.3	24.9	12.1	56.7	30.9	12.4

10. **Objectives:** During the year, lessons in a course vary in the difficulty and complexity of their objectives for student learning, and in the strategies used to achieve them. Listed below are typical learning objectives. Circle the response that indicates for each objective the average frequency with which it occurs in the designated class.

	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
Student learning objective:					
a. Memorize (e.g., facts, definitions, or formulae)	5.4	15.6	24.8	28.9	25.2
b. Understand (e.g., concepts, relationships, theorems)	0.0	1.0	3.8	14.0	81.2
c. Collect data (e.g., observe, measure, count)	11.2	25.5	39.1	19.0	5.1
d. Order, compare, estimate, approximate	3.5	10.8	34.4	31.6	19.8
e. Perform mathematical operations, execute algorithms, classify	0.7	2.7	9.2	22.8	64.6
f. Solve "story" problems with familiar structures, replicate proofs	1.7	7.1	23.1	37.6	30.5
g. Recognize and solve story problems with unfamiliar or complex structures	5.8	13.7	35.8	29.7	15.0
h. Interpret data (e.g., charts, graphs, tables)	5.5	18.1	41.6	24.6	10.2
i. Build and revise theories, develop proofs	29.4	25.6	21.8	15.4	7.5

11. **Assessment content:** On the tests, quizzes, projects, portfolio products, and other formal assessment strategies you use in this class, how often do the following kinds of items appear?

	Never	Only during units focusing on that skill	Occasionally	Average of once per assessment	Twice or more per assessment
a. Items that require students to compute answers	0.0	1.7	3.0	7.1	88.2
b. Items that require students to recognize or recall definitions or concepts	0.0	3.1	13.6	23.1	60.3
c. Items that allow more than one solution or approach	1.7	5.1	51.7	31.9	39.3
d. Items that require more than one step to reach a solution	0.0	2.4	5.1	16.3	76.3
e. Items that require students to explain concepts in words or pictures	7.5	14.3	39.1	23.5	15.6
f. Items that require students to observe or measure	12.2	28.8	36.3	17.6	5.1
g. Items that require students to compare an estimated answer with a calculated or computed answer	9.5	21.1	38.1	20.4	10.9
h. Items that require the use of algorithms to solve problems	7.9	8.9	22.9	21.6	33.7
i. Items that require students to describe how they solved problems by showing all their work, writing explanations, or drawing pictures	1.7	7.1	13.9	25.1	52.2
j. Items that require students to interpret tabular or graphical data	9.2	28.8	35.6	20.3	5.8
k. Items that require the application of familiar concepts or principles to different or unfamiliar situations	4.1	9.2	37.1	32.0	17.7
l. Items that require a critique or analysis of a suggested solution to a problem	28.2	17.7	33.7	11.2	8.8
m. Other (specify)_____					

12. Indicate the extent to which this course--as it is taught to the single designated class--is interdisciplinary or integrated with another course, if at all. By this we mean that certain topics are taught together to enhance the depth of both, such as combining math and science units that rely on statistical analysis or using mathematical skills to represent and understand historical or political trends. Circle the appropriate response on each line.

	Never	1 or 2 periods per semester	1 or 2 periods per month	One period per week	> 1 period per week
a. I use examples or illustrations from other subject areas in my math teaching, e.g., in "story" or other application problems.	4.1	19.0	27.9	28.9	19.7
b. I blend the teaching of another subject area into my math teaching in this class.	19.9	28.0	28.4	14.9	8.8
c. I work with teachers from one or more subject areas to integrate other subjects into my math teaching.	50.2	29.2	10.5	6.1	4.1

d. A subject area I use more often than others to illustrate math applications is _____

Science	12
Business	1
Other	2

Science	180
English/Language Arts	5
Business	35
Computers	3
Other	31

III. Instruction

13. **Teacher activity:** Different instructional strategies involve different types of teacher activity during a lesson. For each <u>teacher</u> activity listed below, first circle the response that indicates how often you do it with your <u>designated class</u>, and then circle the letter that indicates about how much total time per period you typically spend when you do it. (You may engage in more than one activity during a class session.) Do not answer the "time" item if your "frequency" response is "never."

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
a. Lecture, perhaps occasionally soliciting brief student input or using the board or overhead projector to highlight a key term or present an outline	2.7	3.1	5.8	11.6	76.9	17.3	57.0	25.0
b. Demonstrate a concept, using two-dimensional graphics such as drawings on the board, overhead projector, or computer	0.7	2.7	8.2	17.7	70.7	24.2	53.3	21.8
c. Demonstrate a concept, using three-dimensional tools such as manipulatives, models, or other objects	7.5	24.8	30.6	22.1	15.0	47.6	13.5	39.0
d. Lead students in recitation, drills, or question-and-answer sessions	13.0	18.8	17.7	19.8	30.7	53.2	32.4	14.4
e. Observe or monitor student-led whole class discussions or demonstrations related to mathematics	26.0	28.8	21.2	13.7	10.3	35.2	39.8	24.5
f. Provide individual or small group tutoring as needed during individual seatwork or small group activities involving everyone in class	2.7	7.5	11.5	23.4	54.9	20.8	47.9	30.6
g. Provide remedial or enriching instruction to a pull-out group while the rest of the class works on assignments	31.2	26.0	19.2	10.6	13.0	41.2	43.2	15.6
h. Work on administrative tasks, such as recordkeeping, while students work on assignments	42.5	19.9	15.4	13.4	8.9	64.0	31.1	4.9
i. Administer a test or a quiz	0.0	2.0	36.7	49.7	11.2	2.8	17.4	78.0
j. Stimulate student discussions of approaches to solving problems, explanations of their mathematical thinking, or open-ended questions	1.4	8.3	20.4	27.0	42.9	25.4	57.3	16.5
k. Demonstrate uses of technology in mathematics	7.8	23.7	26.8	19.3	22.0	36.9	41.8	21.3
l. Set up and monitor or supervise cooperative learning activities	12.6	21.1	29.9	18.0	18.4	9.9	40.1	49.6

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14. **Context factors:** Listed below are two kinds of factors that may characterize a class and, where present, may require accommodation in instruction. The first set of factors are student characteristics that contribute to diversity. The second set are usually viewed as problematic. Both types vary quite a lot across schools, districts, and regions. For each factor, please indicate whether it is present to any degree.

	Present in Class?			
	No	Minimally	Moderately	Considerably
Student Diversity				
a. Students have very different academic abilities in this subject.	2.7	23.4	44.7	29.2
b. Students have different backgrounds, e.g., economic, language, culture.	9.1	40.9	29.7	20.3
c. Some students have special needs, e.g., physical or emotional impairment.	30.1	49.3	13.2	7.4
Problems				
d. Students are inadequately prepared for level of material.	15.2	45.3	27.7	11.5
e. Students are disinterested.	16.2	46.6	25.3	11.5
f. There are threats to students' personal safety.	80.4	17.6	1.4	0.7
g. There is a shortage of appropriate technology for student use.	33.2	27.1	24.1	15.6
h. There is a shortage of other equipment for student use.	37.1	32.7	21.1	9.2
i. Students have low morale.	34.2	43.7	15.6	6.4
j. Parents are not interested in their child's learning.	36.5	38.5	19.6	5.4
k. Family problems preoccupy students.	13.9	54.7	23.6	7.8
l. There is a shortage of appropriate technology for teacher use.	30.2	32.5	24.7	12.5
m. There is a shortage of other equipment for teacher use.	32.9	33.9	21.7	11.5
n. There is a shortage of preparation and planning time for teachers.	33.6	29.5	22.4	14.2

14. **Context factors (cont.):**

	Present in Class?			
	No	Minimally	Moderately	Considerably
Problems (cont.)				
o. There are threats to teachers' personal safety.	82.4	14.9	2.7	0.0
p. Physical facilities are inadequate.	49.8	30.8	13.6	5.8
q. Administrative support for instruction is inadequate.	55.6	31.2	9.5	3.7

15. **Student activities:** Listed below are many kinds of student lesson activities, some with a long history of use in math classes and others associated with recent reform efforts. First, scan the whole list from a to x to see the array of choices, then circle the number next to each that indicates how often--if at all--the way you teach the designated class during the regular class period requires that students engage in each activity. Do not answer the "time" item if your "frequency" response is "never."

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
a. Listen to or observe teacher presentations	3.0	1.7	4.1	7.8	83.4	17.3	56.0	26.1
b. Work individually on exercises, worksheets, or workbooks	3.7	5.1	9.2	14.6	67.5	23.8	53.2	22.7
c. Use a textbook for activities other than homework, e.g., reading or reference	19.5	15.7	21.5	20.1	22.9	59.1	28.0	12.9
d. Use supplementary printed materials	4.4	9.5	23.6	30.1	31.8	26.8	53.9	18.9
e. Participate in whole-class discussions	2.0	9.2	18.6	19.0	51.2	36.6	49.5	13.9
f. Explain how what they learn in class relates to the real world	7.8	19.0	31.6	25.9	15.6	68.0	27.5	4.5
g. Engage in on-task discussion primarily with other students	5.8	9.5	15.3	24.1	45.2	39.3	45.1	15.3
h. Correct or review previous day's homework	2.0	1.4	4.4	7.1	85.1	56.8	36.5	6.0
i. Work on projects/ assignments that take a week or more to finish	42.0	31.1	15.4	9.6	2.0	29.7	27.9	42.4
j. Give or listen to other students give oral reports	58.6	28.1	6.8	4.7	1.7	36.4	29.5	34.1
k. Solve problems for which there are several appropriate answers or approaches	3.7	15.6	28.5	24.4	27.5	36.7	48.6	14.7
l. Write a report or paper	60.7	30.2	7.8	1.4	0.0	33.0	32.2	34.8

15. **Student activities (cont.):**...Indicate how often--if at all--the lesson activities you use with the designated class during the regular class period require that students:

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
m. Work in small groups	3.4	12.9	20.3	24.1	39.3	9.6	52.5	37.1
n. Do lab or field work	56.7	26.6	11.9	2.0	2.0	16.4	28.9	52.3
o. Evaluate other students' work	38.6	23.9	14.7	10.2	12.6	59.6	31.5	8.4
p. Practice or drill on computational skills	16.9	12.8	20.3	20.7	29.0	49.6	36.4	13.1
q. Work on assignments that will be due as homework on the next day	6.8	7.1	8.2	13.9	63.9	45.2	40.4	13.6
r. Respond orally to questions testing recall	3.1	5.1	12.6	25.5	53.4	65.5	28.1	6.0
s. Respond orally to open-ended questions	6.6	8.6	16.2	24.5	43.8	67.7	26.0	5.6
t. Take notes	3.7	3.1	7.1	13.6	72.4	39.1	44.5	15.7
u. Explain to the whole class solutions developed individually or in small groups	12.6	15.6	22.8	26.2	22.8	53.4	36.0	9.9
v. Participate in structured cooperative learning activities	16.9	20.3	29.0	16.6	17.2	13.6	46.2	39.8
w. Take tests, quizzes, other assessments	1.4	30.2	49.8	18.0	0.7	1.4	25.1	71.5
x. Wait for completion of non-academic tasks, e.g., attendance, homework collection, behavior management, etc.	20.5	18.4	8.3	10.1	42.7	93.9	5.2	0.4

16. **Non-academic time:** How many minutes during each meeting of your designated class do you typically spend on activities not directly related to the academic content of this course? (Examples: listening to or making announcements, taking attendance, establishing rapport, or handling disruptions.)

25% = 2
50% = 5
75% = 6

17. **Demonstrating math competencies:** As a result of successful study, students are able to demonstrate proficiency in tasks of different levels of difficulty and complexity. In the designated class, how often do students have formal or informal opportunities to demonstrate the following competencies? Circle one response on each line.

	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
a. Memorize basic number facts or formulae	6.8	9.9	24.3	27.7	31.2
b. Understand a math concept	0.0	0.0	2.03	21.1	76.9
c. Collect original data	21.7	38.6	24.5	12.1	3.1
d. Organize, summarize, or display information	7.2	23.5	27.6	20.8	20.8
e. Use estimation to determine the reasonableness of results	3.7	12.6	23.5	34.7	25.5
f. Perform computations using basic number facts	2.4	4.4	7.1	17.0	69.0
g. Use algebraic or geometric reasoning strategies to solve problems	0.3	2.4	9.2	18.0	70.1
h. Analyze and interpret information	1.0	7.8	18.7	29.6	42.9
i. Generalize from patterns or examples	2.7	4.8	24.9	30.0	37.5
j. Generate original examples	10.6	26.3	33.4	19.8	9.9

Appendix F

Distribution of Case Study Survey Item Responses

Case Study Reponses (N=41)

I. Teaching and Learning Conditions of the School and Designated Mathematics Class

When you answer the questions, think of a single class for which you had primary responsibility last semester. If you were responsible for multiple sections of one or more of the focus courses, select your first such class of the day (not homeroom), and think of this as the designated class.

1. What is the course title? _____

2. What is the usual schedule and length (in minutes) of daily class meetings for the designated class? If the weekly schedule is normally the same, just complete Week 1.

	Week 1	Week 2	Examples		
			Wk 1	Wk 2	Wk 1
Monday	_____	_____	90	_____	45
Tuesday	_____	_____	_____	90	45
Wednesday	_____	_____	90	_____	45
Thursday	_____	_____	_____	90	45
Friday	_____	_____	90		45

3. In what grade(s) are the students in your designated class enrolled? Enter the number of students at each grade level.

Ungraded	____	9th	____
6th	____	10th	____
7th	____	11th	____
8th	____	12th	____

4. Estimate the percentage of students in your designated class who function at each level of academic ability in mathematics. Use the best information you have readily available (including your own professional judgment). Percentages should total to 100%.

Much above the **SCHOOL** average	19.5 %
Somewhat above the **SCHOOL** average	27.2 %
At the **SCHOOL** average	35.3 %
Somewhat below the **SCHOOL** average	12.3 %
Much below the **SCHOOL** average	6.5 %
TOTAL	100 %

5. In your opinion, what percentage of the students who enrolled in this class at the beginning are capable of learning the required material given available time and resources?

_____ percent

6. At this school, how much actual influence do you think teachers have over the following?

	No influence				Complete influence
a. Setting policy on grouping students in classes by ability	19.5	17.1	24.4	31.7	7.3
b. Deciding which students take which courses	4.9	12.2	39.0	41.5	2.4
c. Determining discipline policy within your classroom	0.0	0.0	4.9	63.4	31.7

7. How much control do you have over each of the following areas of planning and teaching? On the left response set, indicate how much control you have through participation or representation in department, or school, or district decision groups; on the right, indicate the control you have in your own classroom.

Through my participation in department, school, or district decisions						In my own classroom					
No Control				Complete Control			No Control				Complete Control
12.5	5.0	32.5	40.0	10.0	a. Selecting textbooks	12.2	14.6	7.3	41.5	24.4
7.5	7.5	17.5	52.5	15.0	b. Selecting instructional materials	0	0	0	48.8	51.2
12.5	7.5	25.0	37.5	17.5	c. Selecting content, topics and skills to be taught	2.4	2.4	9.8	46.3	39.0
12.5	5.0	12.5	20.0	50.0	d. Selecting teaching techniques	0	0	0	12.2	87.8
12.5	12.5	22.5	15.0	37.5	e. Determining the amount of homework to be assigned	0	0	2.4	14.6	82.9
17.5	2.5	25.0	35.0	20.0	f. Setting standards for grading in your classes	0	0	2.4	34.1	63.4
12.5	12.5	22.5	32.5	20.0	g. Disciplining students	0	0	4.9	56.1	39.0

II. Course Content and Emphasis

8. **Math content areas:** Estimate the percentage of time (if any) that you have spent or will spend during this course teaching each content area listed below in the designated class. The total should equal 100 percent.

Number Use/Operations
(Estimation, computational algorithms, fractions, decimals, ratio and proportion, percent, real numbers, number theory, order of operations, relationships between operations) _____%

Measurement
(Use of measuring instruments, theory [arbitrary, standard, size], conversions, metric [SI] system, length, perimeter, area, volume, surface area angles, circles [e.g., pi, radius, diameter, area], Pythagorean theorem, mass [weight], time, temperature, speed) _____%

Consumer Applications
(Simple interest, compound interest, rates [e.g., discount, commission], spread sheets) _____%

Data Analysis
(Bar graphs, histograms, pictographs, line graphs, stem and leaf plots, scatter plots, box plots, mean, median, mode, mean deviation, smoothing of graphs) _____%

Pre-Algebra
(Integers, absolute value, exponents, scientific notation, use of variables, expressions, evaluation of formulas and expressions, one-step equations, coordinate plane) _____%

Basic Algebra
(Multi-step equations, inequalities, literal equations, lines [slope and intercept], operations on polynomials, factoring, square roots and radicals, operations on radicals, rational expressions) _____%

Advanced Algebra
(Quadratic equations, systems of equations, systems of inequalities, compound inequalities, matrices [determinants], conic sections, rational, negative exponents, radicals, rules for exponents, complex numbers binomial theorem, factor [remainder theorems], field properties of real number system) _____%

Functions
(Notation, relations, linear, quadratic, polynomial, rational, logarithmic, exponential, trigonometric/circular, inverse, composition) _____%

Basic (non-measurement) Geometry
(Basic terminology, relationships between lines, angles, planes, triangles, quadrilaterals, polygons, congruence, similarity, parallels, circles, constructions) _____%

Advanced Geometry
(Logic, reasoning, proof, symmetries, loci, spheres, cones, cylinders, polyhedra, 3-dimensional relationships, transformational, coordinate, vectors, analytic, non-Euclidean, topology) _____%

[Topic list continues on next page]

8. **Math content areas (cont.):**

Trigonometry

(Basic ratios, radian measures, right triangle trigonometry, law of Sines, Cosines, identities, trigonometric equations, polar coordinates, periodicity, amplitude) _____%

Statistics

(Variability/standard deviation, quartiles, percentiles, bivariate distributions, sampling, confluence intervals, correlation, lines of best fit, hypothesis testing, Chi-square, data transformation, central limit theorem) _____%

Probability

(Sample spaces, compound probability, conditional probability, independent and dependent events, empirical, expected value, binomial distribution, normal curve) _____%

Finite Math/Special Topics

(Sets, logic, mathematical induction, linear programming, networks, iteration and recursion, permutations/combinations, simulations, fractals) _____%

Analysis

(Sequences and series, limits, continuity, rates of change, maxima, minima, differentiation, integration) _____%

TOTAL 100 %

9. **Dimensions of math:** Math courses approach the study of skills and concepts in many ways, and material covered during a given period may include several emphases. Listed below are cross-cutting dimensions of mathematics that may be covered during any class meeting. First, please circle the response that indicates how frequently activities in the designated class emphasize each dimension. Second, circle the response that indicates about how much time you typically spend on that dimension when you do include it. (For example, if you usually open class meetings with a short, real-life application problem, you would circle 4 for "more than once a week" and a for "10 minutes or less.") Do not answer the "time" item if your "frequency" response is "never." If your school is not on semesters, answer for half a year.

		Frequency of Use					Time Per Typical Use		
		Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
Lesson content emphasis:									
a.	Computational techniques	5.0	5.0	7.5	7.5	75.0	32.5	40.0	27.5
b.	Specific math facts or definitions	0	2.5	12.5	17.5	67.5	42.5	42.5	15.0
c.	Broad math concepts	0	10.0	17.5	30.0	42.5	20.5	46.2	33.3
d.	Problem solving/inquiry skills	0	2.5	12.5	27.5	57.5	10.3	38.5	51.3
e.	Skill in communicating in speech or writing about mathematical ideas or applications	15.0	10.0	17.5	25.0	32.5	60.0	34.3	5.7
f.	Importance of mathematics in daily life	0	12.5	32.5	35.0	20.0	65.9	31.7	2.4
g.	Applications of mathematics in science	2.6	30.8	30.8	20.5	15.4	53.8	41.0	5.1
h.	Applications of mathematics in business and industry	0	30.8	43.6	25.6	0	55.0	37.5	7.5

10. **Objectives:** During the year, lessons in a course vary in the difficulty and complexity of their objectives for student learning, and in the strategies used to achieve them. Listed below are typical learning objectives. Circle the response that indicates for each objective the average frequency with which it occurs in the designated class.

	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
Student learning objective:					
a. Memorize (e.g., facts, definitions, or formulae)	0	26.8	14.6	31.7	26.8
b. Understand (e.g., concepts, relationships, theorems)	0	0	2.4	22.0	75.6
c. Collect data (e.g., observe, measure, count)	12.5	29.3	46.3	12.2	0
d. Order, compare, estimate, approximate	0	28.2	38.5	20.5	12.8
e. Perform mathematical operations, execute algorithms, classify	0	0	5.0	20.0	75.0
f. Solve "story" problems with familiar structures, replicate proofs	0	9.8	22.0	34.1	34.1
g. Recognize and solve story problems with unfamiliar or complex structures	0	25.0	22.5	37.5	15.0
h. Interpret data (e.g., charts, graphs, tables)	2.5	27.5	35.0	17.5	17.5
i. Build and revise theories, develop proofs	34.1	17.1	22.0	19.5	7.3

11. **Assessment content:** On the tests, quizzes, projects, portfolio products, and other formal assessment strategies you use in this class, how often do the following kinds of items appear?

	Never	Only during units focusing on that skill	Occasionally	Average of once per assessment	Twice or more per assessment
a. Items that require students to compute answers	0	2.4	0	2.4	95.1
b. Items that require students to recognize or recall definitions or concepts	2.5	2.5	17.5	25.0	52.5
c. Items that allow more than one solution or approach	0	2.4	34.1	46.3	17.1
d. Items that require more than one step to reach a solution	0	0	0	4.9	95.1
e. Items that require students to explain concepts in words or pictures	2.4	17.1	34.1	31.7	14.6
f. Items that require students to observe or measure	20.0	17.5	45.0	12.5	5.0
g. Items that require students to compare an estimated answer with a calculated or computed answer	14.6	31.7	41.5	7.3	4.9
h. Items that require the use of algorithms to solve problems	4.9	4.9	17.1	43.9	29.3
i. Items that require students to describe how they solved problems by showing all their work, writing explanations, or drawing pictures	0	0	12.2	31.7	56.1
j. Items that require students to interpret tabular or graphical data	14.6	17.1	39.0	22.0	7.3
k. Items that require the application of familiar concepts or principles to different or unfamiliar situations	0	4.9	43.9	36.6	14.6
l. Items that require a critique or analysis of a suggested solution to a problem	29.3	22.0	26.8	19.5	2.4

m. Other (specify)_____

12. Indicate the extent to which this course--as it is taught to the single designated class--is interdisciplinary or integrated with another course, if at all. By this we mean that certain topics are taught together to enhance the depth of both, such as combining math and science units that rely on statistical analysis or using mathematical skills to represent and understand historical or political trends. Circle the appropriate response on each line.

	Never	1 or 2 periods per semester	1 or 2 periods per month	One period per week	> 1 period per week
a. I use examples or illustrations from other subject areas in my math teaching, e.g., in "story" or other application problems.	2.5	22.5	35.0	22.5	17.5
b. I blend the teaching of another subject area into my math teaching in this class.	15.0	42.5	25.0	10.0	7.5
c. I work with teachers from one or more subject areas to integrate other subjects into my math teaching.	39.0	41.5	7.3	4.9	7.3

d. A subject area I use more often than others to illustrate math applications is _____

Science	5

Science	23
English/Language Arts	1
Business	6
Other	6

III. Instruction

13. **Teacher activity:** Different instructional strategies involve different types of teacher activity during a lesson. For each <u>teacher</u> activity listed below, first circle the response that indicates how often you do it with your <u>designated class</u>, and then circle the letter that indicates about how much total time per period you typically spend when you do it. (You may engage in more than one activity during a class session.) Do not answer the "time" item if your "frequency" response is "never."

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
a. Lecture, perhaps occasionally soliciting brief student input or using the board or overhead projector to highlight a key term or present an outline	0	2.4	0	4.9	92.7	10.0	57.5	32.5
b. Demonstrate a concept, using two-dimensional graphics such as drawings on the board, overhead projector, or computer	5.0	0	10.0	17.5	67.5	20.5	64.1	15.4
c. Demonstrate a concept, using three-dimensional tools such as manipulatives, models, or other objects	15.4	33.3	25.6	20.5	5.1	43.8	46.9	9.4
d. Lead students in recitation, drills, or question-and-answer sessions	12.8	15.4	20.5	20.5	30.8	62.9	28.6	8.6
e. Observe or monitor student-led whole class discussions or demonstrations related to mathematics	29.3	24.4	29.3	2.4	14.6	14.8	55.6	29.6
f. Provide individual or small group tutoring as needed during individual seatwork or small group activities involving everyone in class	0	4.9	19.5	7.3	68.3	19.5	41.5	39.0
g. Provide remedial or enriching instruction to a pull-out group while the rest of the class works on assignments	38.5	25.6	15.4	12.8	7.7	37.5	50.0	12.5
h. Work on administrative tasks, such as recordkeeping, while students work on assignments	20.5	35.9	15.4	10.3	17.9	67.7	25.8	6.5
i. Administer a test or a quiz	2.4	4.9	48.8	36.6	7.3	2.5	7.5	90.0
j. Stimulate student discussions of approaches to solving problems, explanations of their mathematical thinking, or open-ended questions	4.9	9.8	19.5	34.1	31.7	25.6	46.2	28.2
k. Demonstrate uses of technology in mathematics	12.2	24.4	19.5	17.1	26.8	33.3	33.3	33.3
l. Set up and monitor or supervise cooperative learning activities	24.4	22.0	29.3	12.2	12.2	12.9	29.0	58.1

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14. **Context factors:** Listed below are two kinds of factors that may characterize a class and, where present, may require accommodation in instruction. The first set of factors are student characteristics that contribute to diversity. The second set are usually viewed as problematic. Both types vary quite a lot across schools, districts, and regions. For each factor, please indicate whether it is present to any degree.

	Present in Class?			
	No	Minimally	Moderately	Considerably
Student Diversity				
a. Students have very different academic abilities in this subject.	0	24.4	43.9	31.7
b. Students have different backgrounds, e.g., economic, language, culture.	12.5	30.0	40.0	17.5
c. Some students have special needs, e.g., physical or emotional impairment.	17.1	61.0	17.1	4.9
Problems				
d. Students are inadequately prepared for level of material.	19.5	39.0	26.8	14.6
e. Students are disinterested.	12.2	56.1	22.0	9.8
f. There are threats to students' personal safety.	87.5	12.5	0	0
g. There is a shortage of appropriate technology for student use.	25.0	35.0	30.0	10.0
h. There is a shortage of other equipment for student use.	32.5	32.5	25.0	10.0
i. Students have low morale.	47.5	30.0	20.0	2.5
j. Parents are not interested in their child's learning.	42.5	27.5	27.5	2.5
k. Family problems preoccupy students.	10.0	60.0	22.5	7.5
l. There is a shortage of appropriate technology for teacher use.	30.8	30.8	33.3	5.1
m. There is a shortage of other equipment for teacher use.	27.5	35.0	32.5	5.0
n. There is a shortage of preparation and planning time for teachers.	26.8	29.3	29.3	14.6

14. **Context factors (cont.):**

	Present in Class?			
	No	Minimally	Moderately	Considerably
Problems (cont.)				
o. There are threats to teachers' personal safety.	77.5	22.5	0	0
p. Physical facilities are inadequate.	35.9	41.0	17.9	5.1
q. Administrative support for instruction is inadequate.	50.0	30.0	17.5	2.5

15. **Student activities:** Listed below are many kinds of student lesson activities, some with a long history of use in math classes and others associated with recent reform efforts. First, scan the whole list from a to x to see the array of choices, then circle the number next to each that indicates how often--if at all--the way you teach the <u>designated class</u> during the regular class period requires that <u>students</u> engage in each activity. Do not answer the "time" item if your "frequency" response is "never."

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
a. Listen to or observe teacher presentations	0	0	0	0	100.0	7.5	60.0	32.5
b. Work individually on exercises, worksheets, or workbooks	2.6	0	10.3	17.9	69.2	21.1	42.1	36.8
c. Use a textbook for activities other than homework, e.g., reading or reference	30.8	15.4	7.7	17.9	28.2	32.1	46.4	17.9
d. Use supplementary printed materials	2.5	15.0	27.5	25.0	30.0	15.4	48.7	35.9
e. Participate in whole-class discussions	10.0	17.5	12.5	12.5	47.5	33.3	52.8	13.9
f. Explain how what they learn in class relates to the real world	15.0	22.5	22.5	30.0	10.0	57.6	36.4	6.1
g. Engage in on-task discussion primarily with other students.	12.5	15.0	12.5	17.5	42.5	40.0	48.6	11.4
h. Correct or review previous day's homework	2.5	2.5	5.0	12.5	77.5	53.8	43.6	2.6
i. Work on projects/assignments that take a week or more to finish	41.0	30.8	20.5	7.7	0	31.8	18.2	50.0
j. Give or listen to other students give oral reports	51.3	38.5	10.3	0	0	16.7	22.2	61.1
k. Solve problems for which there are several appropriate answers or approaches	7.5	17.5	40.0	17.5	17.5	27.8	52.8	19.4
l. Write a report or paper	56.4	41.0	2.6	0	0	23.5	29.4	47.1

15. **Student activities (cont.):**...Indicate how often--if at all--the lesson activities you use with the designated class during the regular class period require that students:

	Frequency of Use					Time Per Typical Use		
	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week	≤ 10 minutes	< ½ period	≥ ½ period
m. Work in small groups	12.5	15.0	12.5	15.0	45.0	11.1	41.7	47.2
n. Do lab or field work	55.3	18.4	26.3	0	0	11.8	52.9	35.3
o. Evaluate other students' work	33.3	25.6	15.4	20.5	5.1	53.6	39.3	7.1
p. Practice or drill on computational skills	20.5	17.9	25.6	15.4	20.5	60.6	30.3	9.1
q. Work on assignments that will be due as homework on the next day	0	5.0	12.5	22.5	60.0	46.3	31.7	22.0
r. Respond orally to questions testing recall	2.5	5.0	2.5	35.0	55.0	55.0	37.5	7.5
s. Respond orally to open-ended questions	5.0	2.5	20.0	32.5	40.0	59.0	35.9	5.1
t. Take notes	5.0	2.5	5.0	7.5	80.0	25.6	48.7	25.6
u. Explain to the whole class solutions developed individually or in small groups	15.0	17.5	30.0	25.0	12.5	44.1	44.1	11.8
v. Participate in structured cooperative learning activities	27.5	20.0	27.5	7.5	17.5	6.7	43.3	50.0
w. Take tests, quizzes, other assessments	0	0	46.3	31.7	22.0	2.4	4.9	92.7
x. Wait for completion of non-academic tasks, e.g., attendance, homework collection, behavior management, etc.	12.8	10.3	0	15.4	61.5	94.3	2.9	2.9

16. **Non-academic time:** How many minutes during each meeting of your designated class do you typically spend on activities not directly related to the academic content of this course? (Examples: listening to or making announcements, taking attendance, establishing rapport, or handling disruptions.)

25% = 3
50% = 5
75% = 8

17. **Demonstrating math competencies:** As a result of successful study, students are able to demonstrate proficiency in tasks of different levels of difficulty and complexity. In the designated class, how often do students have formal or informal opportunities to demonstrate the following competencies? Circle one response on each line.

	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
a. Memorize basic number facts or formulae	9.8	4.9	22.0	31.7	31.7
b. Understand a math concept	0	0	2.4	7.3	90.2
c. Collect original data	37.5	30.0	25.0	5.0	2.5
d. Organize, summarize, or display information	17.9	33.3	20.5	15.4	12.8
e. Use estimation to determine the reasonableness of results	5.0	25.0	20.0	32.5	17.5
f. Perform computations using basic number facts	0	7.3	7.3	9.8	75.6
g. Use algebraic or geometric reasoning strategies to solve problems	0	0	4.9	17.1	78.0
h. Analyze and interpret information	7.3	4.9	19.5	34.1	34.1
i. Generalize from patterns or examples	2.4	7.3	22.0	41.5	26.8
j. Generate original examples	22.0	41.5	24.4	12.2	0

IV. Materials

18. **Teacher materials:** Indicate the extent to which the materials and equipment listed below are available, and the frequency with which you use them to teach your designated class. Indicate frequency of use only if the item was available. (Note, a separate item will ask how often students use them.)

0 = The item was not available
1 = Item was available in limited supply or with limited functions so that use was less effective than it could have been.
2 = Item was available in adequate supply and/or with appropriate functions for most effective use.

	Availability			Frequency of Use				
	Not available	Limited availability	Full availability	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
a. Board	0	2.4	97.6	2.6	0	5.1	2.6	89.7
b. Graph paper	0	22.0	78.0	0	17.5	35.0	30.0	17.5
c. Protractors, rulers, or compasses	10.0	10.0	80.0	8.3	25.0	36.1	8.3	22.2
d. Appropriate calculator	0	12.2	87.8	2.5	5.0	7.5	17.5	67.5
e. Overhead projector	4.9	14.6	80.5	10.3	15.4	15.4	20.5	38.5
f. Film or videotape	25.6	46.2	28.2	30.0	50.0	20.0	0	0
g. Computer or computer programs	22.5	65.0	12.5	30.3	45.5	18.2	3.0	3.0
h. Manipulatives, models, or other objects	9.8	53.7	36.6	10.5	31.6	39.5	13.2	5.3
i. Other (specify) _____								

19. **Student materials:** Indicate the extent to which materials and equipment listed below are available, and the frequency with which students in your designated class use them during a regular class period. Indicate frequency of use only if the item was available.

0 = The item was not available
1 = Item was available in limited supply or with limited functions so that use was less effective than it could have been.
2 = Item was available in adequate supply and/or with appropriate functions for most effective use.

	Availability			Frequency of Use				
	Not Available	Limited Availability	Full Availability	Never	1 or 2 periods per semester (or half year)	1 or 2 periods per month	One period per week	> 1 period per week
a. Board	2.5	7.5	90.0	5.3	13.2	34.2	13.2	34.2
b. Graph paper	2.6	23.1	74.4	0	10.5	36.8	26.3	26.3
c. Protractors, rulers, or compasses	7.9	18.4	73.7	5.6	25.0	30.6	16.7	22.2
d. Appropriate calculator	0	25.0	75.0	0	2.5	0	25.0	72.5
e. Overhead projector	10.3	20.5	69.2	37.8	16.2	21.6	10.8	13.5
f. Film or videotape	40.5	40.5	18.9	62.1	27.6	10.3	0	0
g. Computer or computer programs	30.8	64.1	5.1	35.5	38.7	19.4	3.2	3.2
h. Manipulatives, models, or other objects	23.1	53.8	23.1	9.1	42.4	33.3	12.1	3.0
i. Other (specify) _____								

The following items concern the questionnaire itself. Information you provide will help us improve the questionnaire for future use.

20. Were any of the questions confusing or unclear?

____ No

____ Yes If yes, please list the question number and describe the source of confusion.

Number	*Source of confusion*
____	_____
____	_____
____	_____
____	_____
____	_____
____	_____

21. Use the space below to describe any other problems or make any recommendations about the questionnaire.

_____

_____

_____

_____

_____

Please remember to note the time you finish and record the total time you spent on this survey on the front page. Thank you again for your help.

Appendix G

Case Study Teacher and Observer Log Use

Appendix G

Frequency of Log Use

item		Percent Total Observation Log use (a)	Percent Observer Observation Log use (n=41) (b)	Percent Teacher Observation Log use (n=41) (c)	Percent Case Study Teacher Log Use (n=700) (d)
10	a	51.2	39.0	63.4	40.3
	b	92.7	85.4	100.0	83.6
	c	6.1	2.4	9.8	6.6
	d	7.3	7.3	7.3	19.6
	e	85.4	85.4	85.4	79.3
	f	75.6	75.6	75.6	68.1
	g	51.2	41.5	61.0	51.1
	h	15.9	7.3	24.4	19.3
	i	15.9	7.3	24.4	10.1
13	a	98.8	97.6	100.0	80.9
	b	51.2	46.3	56.1	34.1
	c	9.8	9.8	9.8	4.7
	d	76.8	70.7	82.9	50.4
	e	15.9	7.3	24.4	18.1
	f	73.2	70.7	75.6	57.4
	g	2.4	0.0	4.9	8.9
	h	64.6	61.0	68.3	52.9
	i	8.5	4.9	12.2	21.4
	j	48.8	29.3	68.3	33.7
	k	11.0	2.4	19.5	14.9
	l	15.9	9.8	22.0	13.4
15	a	100.0	100.0	100.0	90.6
	b	81.7	80.5	82.9	59.9
	c	35.4	34.1	36.6	27.7
	d	37.8	34.1	41.5	29.3
	e	53.7	43.9	63.4	44.3
	f	14.6	7.3	22.0	18.6
	g	46.3	43.9	48.8	31.0
	h	54.9	48.8	61.0	51.3
	i	3.7	2.4	4.9	5.1
	j	7.3	7.3	7.3	3.6
	k	41.5	34.1	48.8	30.7
	l	1.2	2.4	0.0	1.4
	m	40.2	36.6	43.9	36.6
	n	0.0	0.0	0.0	2.0
	o	28.0	24.4	31.7	25.6
	p	32.9	17.1	48.8	30.9
	q	53.7	51.2	56.1	42.4

Appendix G

Frequency of Log Use

item		Percent Total Observation Log use (a)	Percent Observer Observation Log use (n=41) (b)	Percent Teacher Observation Log use (n=41) (c)	Percent Case Study Teacher Log Use (n=700) (d)
	r	87.8	85.4	90.2	40.4
	s	59.8	63.4	56.1	31.9
	t	61.0	53.7	68.3	47.9
	u	36.6	39.0	34.1	17.4
	v	12.2	4.9	19.5	11.7
	w	8.5	7.3	9.8	22.6
	x	56.1	48.8	63.4	9.4
18	a	78.0	78.0	78.0	72.1
	b	6.1	2.4	9.8	15.3
	c	6.1	4.9	7.3	10.6
	d	26.8	17.1	36.6	36.4
	e	37.8	36.6	39.0	33.4
	f	0.0	0.0	0.0	1.4
	g	0.0	0.0	0.0	0.9
	h	14.6	12.2	17.1	8.6
19	a	12.2	12.2	12.2	24.3
	b	15.9	19.5	12.2	22.1
	c	13.4	9.8	17.1	14.3
	d	70.7	70.7	70.7	70.6
	e	1.2	0.0	2.4	5.3
	f	0.0	0.0	0.0	1.6
	g	0.0	0.0	0.0	2.0
	h	9.8	4.9	14.6	7.7

Appendix H

Comparing Case Study Teacher Log Entries with Observer Entries

Appendix H

Comparing Case Study Teacher Log Entries with Observer Entries

		Agreement on occurrence		Agreement on length of time		
item		Percent Agreement (a)	Where nonagreement, % of teachers reporting use (0 says no) (b)	Direct Agreement (c)	Within one response category (d)	Where nonagreement, % of teachers reporting more time (e)
10	a	65.9	85.7	64.3	85.7	60.0
	b	85.4	100.0	57.1	94.3	40.0
	c	92.7	100.0	0.0	0.0	100.0
	d	75.6	100.0	100.0	100.0	NA
	e	90.2	100.0	48.6	85.7	22.2
	f	78.0	66.7	50.0	75.0	14.3
	g	70.7	83.3	60.0	93.3	50.0
	h	78.0	88.9	50.0	100.0	0.0
	i	73.2	81.8	100.0	100.0	NA
13	a	97.6	100.0	77.5	100.0	44.4
	b	75.6	70.0	68.4	73.7	100.0
	c	100.0	NA	25.0	100.0	66.7
	d	75.0	70.0	61.5	92.3	20.0
	e	77.5	88.9	50.0	100.0	0.0
	f	95.0	100.0	72.4	96.6	62.5
	g	95.0	100.0	0.0	0.0	NA
	h	87.5	80.0	92.0	100.0	100.0
	i	92.5	100.0	0.0	100.0	50.0
	j	55.0	94.4	54.5	100.0	80.0
	k	82.5	100.0	100.0	100.0	0.0
	l	82.5	85.7	66.7	100.0	100.0
15	a	100.0	NA	78.0	100.0	22.2
	b	92.7	66.7	53.1	100.0	40.0
	c	82.9	57.1	72.7	90.9	33.3
	d	82.9	71.4	58.3	91.7	60.0
	e	56.1	72.2	69.2	92.3	50.0
	f	80.5	87.5	100.0	100.0	NA
	g	75.6	60.0	50.0	85.7	50.0
	h	73.2	72.7	76.5	100.0	0.0
	i	92.7	66.7	0.0	0.0	0.0
	j	95.1	50.0	50.0	100.0	100.0
	k	70.7	75.0	54.5	100.0	60.0
	l	97.6	0.0	0.0	0.0	0.0
	m	92.7	100.0	53.3	93.3	57.1
	n	100.0	NA	0.0	0.0	0.0
	o	78.0	66.7	57.1	85.7	0.0
	p	63.4	93.3	66.7	100.0	0.0

Appendix H

Comparing Case Study Teacher Log Entries with Observer Entries

item		Agreement on occurrence: Percent Agreement (a)	Agreement on occurrence: Where nonagreement, % of teachers reporting use (0 says no) (b)	Agreement on length of time: Direct Agreement (c)	Agreement on length of time: Within one response category (d)	Agreement on length of time: Where nonagreement, % of teachers reporting more time (e)
	q	85.4	66.7	68.4	100.0	50.0
	r	80.5	62.5	71.0	93.5	33.3
	s	82.9	28.6	71.4	95.2	0.0
	t	80.5	87.5	42.9	100.0	50.0
	u	80.5	37.5	72.7	90.9	33.3
	v	65.9	92.9	0.0	0.0	0.0
	w	97.6	100.0	100.0	100.0	NA
	x	70.7	75.0	94.1	100.0	100.0
18	a	100.0	NA	68.8	96.9	0.0
	b	92.7	100.0	100.0	100.0	50.0
	c	97.6	100.0	50.0	100.0	0.0
	d	80.5	100.0	71.4	71.4	0.0
	e	97.6	100.0	60.0	93.3	66.7
	f	97.6	NA	NA	NA	0.0
	g	100.0	NA	NA	NA	100.0
	h	95.1	100.0	60.0	100.0	100.0
19	a	94.9	50.0	100.0	100.0	0.0
	b	92.3	100.0	20.0	80.0	50.0
	c	92.3	100.0	75.0	75.0	0.0
	d	89.7	50.0	63.0	88.9	50.0
	e	97.4	100.0	0.0	0.0	0.0
	f	100.0	NA	NA	NA	NA
	g	100.0	NA	NA	NA	NA
	h	89.7	100.0	100.0	100.0	0.0

Appendix I

Comparing Case Study Teacher Questionnaire Responses with Log Entries

Appendix I

Comparing Case Study Teacher Questionnaire Responses with Log Entries

item		Comparing Teacher Responses to Questionnaire #1 with Log Entries: Questionnaire responses validated by log frequencies			Comparing Teacher Responses to Questionnaire #2 with Log Entries: Questionnaire responses validated by log frequencies		
		Direct Agreement (a)	Within one response category (b)	Where nonagreement, % of teachers underreporting on survey (c)	Direct Agreement (d)	Within one response category (e)	Where nonagreement, % of teachers underreporting on survey (f)
10	a	41.5	41.5	66.7	35.0	35.0	69.2
	b	75.6	75.6	100.0	75.0	75.0	100.0
	c	51.2	56.1	35.0	57.9	89.5	12.5
	d	35.9	46.2	61.9	63.2	63.2	100.0
	e	67.5	75.0	80.0	45.0	50.0	81.8
	f	34.1	41.5	91.7	25.0	30.0	86.7
	g	22.5	32.5	85.2	31.6	42.1	76.9
	h	37.5	65.0	63.6	45.0	65.0	60.0
	i	61.0	75.6	55.6	52.6	63.2	33.3
13	a1	78.0	80.5	50.0	89.5	89.5	50.0
	b1	50.0	57.5	15.0	40.0	55.0	33.3
	c1	56.4	71.8	17.6	47.4	84.2	10.0
	d1	35.9	48.7	92.0	35.0	45.0	76.9
	e1	46.3	68.3	54.5	57.9	68.4	100.0
	f1	65.9	70.7	71.4	55.0	70.0	88.9
	g1	53.8	74.4	55.6	68.4	94.7	50.0
	h1	23.1	28.2	90.0	36.8	42.1	91.7
	i1	41.5	58.5	62.5	45.0	60.0	90.9
	j1	31.7	61.0	60.7	25.0	40.0	73.3
	k1	41.5	56.1	37.5	42.1	73.7	30.0
	l1	48.8	65.9	42.9	60.0	75.0	37.5
13	a2	58.5	95.1	37.5			
	b2	41.5	82.9	36.4			
	c2	17.1	41.5	8.0			
	d2	51.2	82.9	57.1			
	e2	22.0	48.8	11.1			
	f2	46.3	92.7	36.4			
	g2	12.2	41.5	16.7			
	h2	41.5	56.1	42.9			
	i2	63.4	87.8	28.6			
	j2	34.1	87.8	72.0			
	k2	22.0	65.9	22.2			
	l2	26.8	51.2	20.0			
15	a1	100.0	100.0	0.0	95.0	95.0	100.0
	b1	74.4	79.5	80.0	63.2	78.9	42.9

Appendix I

Comparing Case Study Teacher Questionnaire Responses with Log Entries

		Comparing Teacher Responses to Questionnaire #1 with Log Entries			Comparing Teacher Responses to Questionnaire #2 with Log Entries		
		Questionnaire responses validated by log frequencies			Questionnaire responses validated by log frequencies		
		Direct Agreement	Within one response category	Where nonagreement, % of teachers underreporting on survey	Direct Agreement	Within one response category	Where nonagreement, % of teachers underreporting on survey
		(a)	(b)	(c)	(d)	(e)	(f)
item							
	c1	41.0	53.8	65.2	60.0	75.0	62.5
	d1	40.0	47.5	58.3	45.0	65.0	63.6
	e1	47.5	50.0	71.4	42.1	47.4	72.7
	f1	37.5	60.0	68.0	36.8	57.9	75.0
	g1	40.0	50.0	62.5	10.5	21.1	70.6
	h1	72.5	82.5	45.5	78.9	78.9	50.0
	i1	64.1	76.9	42.9	73.7	84.2	60.0
	j1	84.6	94.9	50.0	89.5	94.7	50.0
	k1	37.5	55.0	68.0	47.4	63.2	60.0
	l1	87.2	97.4	80.0	89.5	100.0	100.0
	m1	62.5	75.0	65.2	45.0	60.0	63.6
	n1	76.3	97.4	58.3	89.5	94.7	0.0
	o1	33.3	53.8	71.4	38.9	50.0	90.9
	p1	28.2	46.2	68.0	36.8	42.1	50.0
	q1	57.5	75.0	62.5	47.4	57.9	60.0
	r1	42.5	57.5	45.5	60.0	65.0	75.0
	s1	40.0	60.0	42.9	45.0	55.0	81.8
	t1	70.0	82.5	50.0	65.0	75.0	42.9
	u1	47.5	57.5	68.0	61.1	88.9	85.7
	v1	57.5	87.5	80.0	65.0	90.0	28.6
	w1	41.5	56.1	66.7	35.0	55.0	61.5
	x1	38.5	53.8	33.3	71.4	71.4	50.0
15	a2	43.9	95.1	40.9			
	b2	46.3	90.2	20.0			
	c2	12.2	48.8	34.8			
	d2	34.1	92.7	80.0			
	e2	31.7	78.0	43.5			
	f2	26.8	58.5	27.3			
	g2	26.8	58.5	54.2			
	h2	61.0	92.7	28.6			
	i2	4.9	22.0	15.0			
	j2	24.4	36.6	87.5			
	k2	34.1	73.2	22.7			
	l2	0.0	9.8	5.9			
	m2	29.3	65.9	33.3			
	n2	9.8	17.1	0.0			
	o2	34.1	56.1	21.4			

Appendix I

Comparing Case Study Teacher Questionnaire Responses with Log Entries

		Comparing Teacher Responses to Questionnaire #1 with Log Entries			Comparing Teacher Responses to Questionnaire #2 with Log Entries		
		Questionnaire responses validated by log frequencies			Questionnaire responses validated by log frequencies		
item		Direct Agreement (a)	Within one response category (b)	Where nonagreement, % of teachers underreporting on survey (c)	Direct Agreement (d)	Within one response category (e)	Where nonagreement, % of teachers underreporting on survey (f)
	p2	46.3	68.3	35.7			
	q2	36.6	95.1	50.0			
	r2	43.9	97.6	26.1			
	s2	43.9	82.9	28.6			
	t2	46.3	95.1	40.0			
	u2	31.7	68.3	28.6			
	v2	19.5	41.5	9.1			
	w2	78.0	95.1	22.2			
	x2	68.3	80.5	14.3			
18	a1	84.6	87.2	33.3	85.0	85.0	66.7
	b1	37.5	60.0	31.3	21.1	52.6	20.0
	c1	41.7	66.7	19.0	35.0	70.0	23.1
	d1	45.0	62.5	26.7	45.0	50.0	0.0
	e1	59.0	79.5	62.5	65.0	85.0	28.6
	f1	66.7	96.7	100.0	89.5	100.0	NA
	g1	78.8	93.9	0.0	83.3	100.0	NA
	h1	47.4	81.6	57.1	78.9	89.5	50.0
19	a1	50.0	68.4	47.4	45.0	65.0 *	45.5
	b1	34.2	52.6	32.0	31.6	42.1	46.2
	c1	41.7	69.4	33.3	30.0	75.0	35.7
	d1	70.0	75.0	70.0	70.0	70.0	83.3
	e1	67.6	81.1	0.0	85.0	90.0	100.0
	f1	75.9	89.7	100.0	81.3	93.8	100.0
	g1	77.4	96.8	0.0	82.4	100.0	NA
	h1	48.5	78.8	71.4	57.9	84.2	100.0

Appendix J

Comparing Case Study Teacher Responses to First and Second Questionnaires

Appendix J

Comparing Case Study Teacher Responses to First and Second Questionnaires

(n=20)

		Agreement on concept		Agreement on duration	
		Direct agreement	Within one response category	Direct agreement	Within one response category
Item		(a)	(b)	(d)	(e)
1					
2					
3					
4	a	40.0	70.0		
	b	10.0	25.0		
	c	15.0	30.0		
	d	35.0	50.0		
	e	45.0	55.0		
5		25.0	55.0		
6	a	55.0	70.0		
	b	55.0	100.0		
	c	50.0	100.0		
7	a	63.2	89.5	50.0	85.0
	b	42.1	100.0	55.0	100.0
	c	31.6	89.5	45.0	95.0
	d	52.6	89.5	70.0	100.0
	e	42.1	89.5	80.0	100.0
	f	31.6	84.2	65.0	100.0
	g	52.6	78.9	50.0	95.0
8					
9	a	55.0	80.0	57.9	89.5
	b	45.0	95.0	45.0	95.0
	c	44.4	88.9	44.4	100.0
	d	47.4	78.9	52.6	100.0
	e	40.0	75.0	35.7	100.0
	f	45.0	95.0	55.0	95.0
	g	45.0	80.0	47.4	94.7
	h	47.4	89.5	52.6	100.0
10	a	35.0	85.0		
	b	75.0	100.0		
	c	57.9	84.2		
	d	22.2	88.9		
	e	47.4	94.7		
	f	50.0	90.0		
	g	38.9	88.9		
	h	26.3	84.2		
	i	31.6	78.9		
11	a	95.0	100.0		
	b	60.0	95.0		
	c	40.0	95.0		

Appendix J

Comparing Case Study Teacher Responses to First and Second Questionnaires

(n=20)

		Agreement on concept		Agreement on duration	
		Direct agreement	Within one response category	Direct agreement	Within one response category
item		(a)	(b)	(d)	(e)
	d	85.0	95.0		
	e	55.0	90.0		
	f	36.8	73.7		
	g	31.6	78.9		
	h	47.4	94.7		
	i	50.0	90.0		
	j	40.0	85.0		
	k	45.0	95.0		
	l	36.8	84.2		
12	a	47.4	84.2		
	b	47.4	94.7		
	c	70.0	100.0		
13	a	89.5	94.7	68.4	94.7
	b	60.0	90.0	68.4	100.0
	c	57.9	89.5	46.7	100.0
	d	25.0	70.0	80.0	93.3
	e	36.8	84.2	66.7	100.0
	f	60.0	90.0	63.2	100.0
	g	36.8	84.2	55.6	100.0
	h	42.1	68.4	61.5	92.3
	i	20.0	100.0	100.0	100.0
	j	30.0	75.0	31.6	94.7
	k	57.9	100.0	37.5	100.0
	l	50.0	100.0	46.2	100.0
14	a	55.0	100.0		
	b	45.0	95.0		
	c	35.0	90.0		
	d	60.0	100.0		
	e	65.0	95.0		
	f	85.0	100.0		
	g	60.0	90.0		
	h	45.0	85.0		
	i	65.0	100.0		
	j	50.0	85.0		
	k	52.6	100.0		
	l	42.1	89.5		
	m	60.0	95.0		
	n	65.0	95.0		
	o				
	p				

Appendix J

Comparing Case Study Teacher Responses to First and Second Questionnaires

(n=20)

		Agreement on concept		Agreement on duration	
		Direct agreement	Within one response category	Direct agreement	Within one response category
item	q	(a)	(b)	(d)	(e)
15	a	95.0	100.0	78.9	94.7
	b	73.7	84.2	77.8	100.0
	c	55.0	75.0	81.8	100.0
	d	45.0	90.0	52.6	100.0
	e	63.2	84.2	64.7	94.1
	f	42.1	84.2	70.6	100.0
	g	21.1	84.2	62.5	100.0
	h	78.9	94.7	78.9	100.0
	i	57.9	94.7	77.8	88.9
	j	68.4	100.0	66.7	100.0
	k	36.8	73.7	64.7	100.0
	l	78.9	94.7	83.3	100.0
	m	55.0	90.0	58.8	100.0
	n	66.7	100.0	50.0	100.0
	o	29.4	76.5	57.1	100.0
	p	27.8	66.7	42.9	92.9
	q	68.4	94.7	55.6	100.0
	r	55.0	90.0	63.2	94.7
	s	30.0	75.0	55.6	94.4
	t	85.0	95.0	61.1	100.0
	u	38.9	83.3	64.3	100.0
	v	50.0	95.0	58.3	100.0
	w	70.0	100.0	95.0	95.0
	x				
16		41.2	58.8		
17	a	58.8	94.1		
	b	70.6	100.0		
	c	62.5	100.0		
	d	50.0	93.8		
	e	58.8	100.0		
	f	58.8	100.0		
	g	64.7	94.1		
	h	47.1	76.5		
	i	35.3	70.6		
	j	43.8	93.8		
18	a	95.0	100.0	73.7	84.2
	b	85.0	100.0	31.6	89.5
	c	85.0	100.0	52.6	94.7
	d	80.0	100.0	60.0	75.0

Appendix J

Comparing Case Study Teacher Responses to First and Second Questionnaires

(n=20)

		Agreement on concept		Agreement on duration	
		Direct agreement	Within one response category	Direct agreement	Within one response category
item		(a)	(b)	(d)	(e)
	e	90.0	100.0	70.0	95.0
	f	68.4	94.7	57.1	100.0
	g	85.0	100.0	73.3	100.0
	h	73.7	100.0	47.4	100.0
19	a	85.0	100.0	52.6	89.5
	b	89.5	100.0	44.4	94.4
	c	85.0	100.0	52.6	94.7
	d	80.0	100.0	75.0	100.0
	e	70.0	95.0	45.0	80.0
	f	47.1	88.2	69.2	100.0
	g	68.4	100.0	61.5	84.6
	h	83.3	100.0	52.9	100.0

Appendix K

Description of Data Analyses

Classroom Instructional Practices: Measuring the Consistency and Reliability of Questionnaire Data

Data Collected and Analyses Performed

The project was designed to provide information that could be used to assess the validity and reliability of survey items on the Classroom Instructional Practices (CIP) Survey. To assess the items, we used information from the following instruments:

Data Collected

Questionnaire mailed to 418 eighth to twelfth grade mathematics teachers and completed by 296

Classroom observation forms for 41 designated classes completed by observers and case study teachers

Classroom logs of daily classroom instructional activities completed by 41 case study teachers for 700 class sessions

CIP survey completed by 41 case study teachers at the beginning of the case study

CIP survey completed by 20 case study teachers at the conclusion of the case study

Analyses Performed

Using data from the above instruments, we conducted the following analyses to assess the validity and reliability of the survey items:

Mail questionnaire item response rate

Mail questionnaire item use rate

Case study teacher and observer use of classroom log items

Agreement between case study teachers and observers on concepts of student learning objectives and instructional activities

Percent of teacher/observer nonagreement in which the teacher indicates the objective or activity did occur (and the observer indicates it did not)

Agreement between case study teachers and observers on length of time for student learning objectives and instructional activities

Percent of teacher/observer nonagreement in which the teacher indicates the objective or activity occurred for a longer length of time (than the observer indicates)

Case study teacher use of classroom log items

Consistency between case study teacher questionnaire responses and logs

Percent of teacher survey and teacher log nonagreement in which teachers underreport on the survey

Consistency between case study teachers' first and second questionnaire responses

The calculation and importance of each analysis is explained below.

Mail Survey Data and Analysis

Mail Survey Item Response Rate (Appendix D, Column b)

The item response rate is a measure of the proportion of all responses that is valid for each survey question. Examples of invalid responses include missing and inappropriate entries such as: (1) multiple responses for a single query; (2) responses that total to more or less than 100 percent (specifically for items 4 and 8); and (3) non-numeric responses where numbers are called for (specifically for item 3).

For each item, the response rate was calculated as follows:

$$\textit{total responses - (missing + inappropriate responses) / total responses}$$

In two-part questions (items 9, 13, 15, 18, 19), respondents were instructed to answer part two only if their part-one response warranted (i.e., they used an instructional technique, an instructional material was available). For these items, inappropriate responses for part two include (in addition to those listed above) responses to part two where none was appropriate. Response rates for part 2 items were calculated as follows:

$$\frac{\textit{total responses - (Part 2 missing and Part 2 inappropriate responses)}}{\textit{total responses - (Part 1 missing + Part 1 never)}}$$

The item response rate shows the level of item clarity, precision, and respondent compliance to survey directions. A low item response rate may indicate that: (1) respondents did not understand the item concept or wording; (2) respondents did not have sufficient knowledge or information to answer the question; or (3) respondents refused to answer the question.

Mail Survey Item Use Rate (Appendix D, Column c)

This calculation is a measure of the number of times that survey respondents indicated they used each instructional objective, method, or material, expressed as a percent of the total number of responses.

The level of reported usage was calculated as follows:

$$\frac{\textit{Total number item responses - number of "never" responses}}{\textit{Total number of item responses}}$$

This measure identifies the most frequently-occurring classroom conditions, content, instruction, and materials. Items with a high percentage indicate that teachers use those most often; those with a low percentage are used least often. Certain objectives, activities, or materials may be incorporated into lessons more frequently because teachers may: (1) feel that certain methods lead to higher levels of success than others; (2) tend to use frequently methods or materials with which they are most comfortable; (3) be unfamiliar with alternative methods; or (4) not have access to alternative materials.

Case Study Data and Analysis

Observation Data

Case Study Teacher and Observer Use of Classroom Log Items (Appendix G, Columns a, b, c)

This calculation is a measure of the number of times during observations that teachers and/or observers indicated the teacher used each instructional objective, instructional method, student activity, or instructional materials (questionnaire items 10, 13, 15, 18, 19), expressed as a percent of the total number of observation logs.

The level of reported usage was calculated as follows:

$$\frac{\text{Total number of times item was checked by teachers and observers on observation logs}}{\text{Total number of logs completed}}$$

This measure identifies the most frequently-used classroom instructional concepts and activities. Items with a high percentage indicate concepts, activities, or materials that teachers use most often; those with a low percentage are used least often. Certain objectives, activities, or materials may be incorporated into lessons more frequently because teachers may: (1) feel that certain methods lead to higher levels of success than others; (2) tend to use frequently methods or materials with which they are most comfortable; (3) be unfamiliar with alternative methods; or (4) not have access to alternative materials.

Case Study Observer Use of Classroom Log Items During Observation (Appendix G, Column b)

Similar to the measure described above, this calculation is a measure of the number of times during observations that the observers indicated the teacher used each instructional objective, instructional method, student activity, or instructional materials (questionnaire items 10, 13, 15, 18, 19), expressed as a percent of the total number of observation logs.

The level of reported usage by observers only was calculated as follows:

$$\frac{\text{Total number of times item was checked by observers on observation logs}}{\text{Total number of logs completed}}$$

Case Study Teacher Use of Classroom Log Items During Observation (Appendix G, Column c)

Similar to both measures above, this calculation is a measure of the number of times during observations that the teachers indicated they used each instructional objective, instructional method, student activity, or instructional materials (questionnaire items 10, 13, 15, 18, 19), expressed as a percent of the total number of observation logs.

The level of reported usage by teachers only was calculated as follows:

$$\frac{\text{Total number of times item was checked by teachers on observation logs}}{\text{Total number of logs completed}}$$

Case Study Teacher Use of Classroom Log Items during the Case Study Period (Appendix G, Column 2d)

This calculation is a measure of the number of times during the four-week case study period that teachers indicated they used each instructional objective, method, activity, or material (questionnaire items 10, 13, 15, 18, 19), expressed as a percent of the total number of classes for which we have log data.

The level of reported usage was calculated as follows:

$$\frac{\text{Total number of times item checked by all case study teachers while completing four weeks of logs}}{\text{Total number of logs completed}}$$

This measure identifies the most frequently-used classroom instructional concepts and activities. Items with a high percentage indicate activities that teachers use most often; those with a low percentage are used least often. Certain objectives and activities may be incorporated into lessons more frequently because teachers may: (1) feel that certain methods lead to higher levels of success than others; (2) tend to use frequently methods with which they are most comfortable; or (3) be unfamiliar with alternative methods.

Agreement Between Case Study Teachers and Observers on Concepts of Student Learning Objectives and Instructional Activities (Appendix H, Column a)

This calculation measures the level of agreement on the understanding and recognition of concepts between case study teachers and classroom observers.

The level of agreement was calculated as follows:

$$\frac{\text{number of times teachers and observers agree that a learning objective or instructional activity did or did not occur}}{\text{total number of logs}}$$

This item reveals the extent to which teachers and observers demonstrated a similar understanding of the concept in question. Low levels of agreement may indicate that teachers and observers attach different conceptual meanings to the survey items or that teachers are unfamiliar with the item wording or concept. A high level of agreement may indicate that teachers and observers attach similar meanings to the concepts.

Percent of Teacher/Observer Nonagreement in which the Teacher Indicates Objective or Activity Did Occur (Appendix H, Column b)

This item explores teacher/observer nonagreement on the occurrence of student learning objectives and classroom instructional activities. In those instances in which there is nonagreement, this item measures the percent of times in which the teacher indicates an objective or activity did occur and the observer indicates it did not occur.

The level of teacher positive response was calculated as follows:

$$\text{where nonagreement,} \quad \frac{\text{the number of times case study teachers report occurrence}}{\text{total number of nonagreements between case study teacher and observer}}$$

This item helps to illuminate the direction of nonagreement between case study teachers and observers for each objective or instructional activity. A high percentage of teacher positive response indicates that teachers consider the objective or activity to have occurred more frequently than observers. A low percentage indicates that observers think an objective or activity occurred more frequently than teachers.

Agreement Between Case Study Teachers and Observers on Length of Time for Student Learning Objects and Instructional Activities (Appendix H, Columns c, d)

This calculation measures the level with which teachers and observers agreed on the length of time that student learning objectives and activities occurred in the observed class, after previously agreeing on the concept. It is measured at two levels: (1) the percent of direct agreement in which teachers and observers agree on the length of time it happened; and (2) the percent of time in which teachers and observers agree within one response category.

The level of direct agreement (column d) was calculated as follows:

$$\text{number of exact agreements / number of logs}$$

The level of agreement within one response category (column e) was calculated as follows:

$$\text{number of exact agreements + number of agreements within one response category / number of logs}$$

These numbers show the level of overall agreement between teachers and observers on the length of the student learning objectives and instructional activities. High percentages suggest that teachers and observers had similar estimated times. Low percentages suggest that teachers and observers estimated time differently.

Percent of Teacher/Observer Nonagreement in which the Teacher Indicates Objective or Activity Occurred for a Longer Period of Time (than the Observer Indicated) (Appendix H, Column e)

This item explores teacher/observer nonagreement on the length of time that the student learning objectives and classroom instructional activities occurred. In those instances in which there is nonagreement, this item measures the percent of times in which the teacher indicates an objective or activity occurred for a longer period of time than the observer indicates.

The level of teachers' report of longer time was calculated as follows:

$$\text{where nonagreement,} \quad \frac{\text{instances in which teachers report longer time}}{\text{total number of nonagreements between case study teacher and observer}}$$

This item helps to illuminate the direction of nonagreement between case study teachers and observers for each objective or instructional activity. A high percentage indicates that teachers think an objective or activity occurred for a longer period of time than did observers. A low percentage indicates that observers think an objective or activity occurred for a longer period of time than did teachers.

Comparing Case Study Teacher Survey Responses with Log Entries

Consistency Between Case Study Teacher Questionnaire Responses and Logs (Appendix I, Columns a, b, d, e)

This calculation measures the consistency of teachers' survey responses on the first and second questionnaires with their daily logs of classroom instructional objectives and activities maintained over a minimum of four weeks. We compared the survey responses of individual teachers with their daily recordings. Consistency is measured at two levels: (1) the percent of direct agreement in which teachers' survey responses and log recordings agree on whether an objective or activity occurred (or not) and the length of time it happened; and (2) the percent of time in which both recordings agree that an objective or activity occurred (or not) and the length of time on both recordings is within one response category.

The level of direct agreement (column h) was calculated as follows:

number of exact agreements / number of logs

The level of agreement within one response category (column i) was calculated as follows:

number of exact agreements + number of agreements within one response category / number of logs

These numbers are a measure of the extent to which teachers' survey responses reflect the type and extent of classroom activities as recorded on daily logs. High percentages suggest that the survey item is a reliable long-term indicator of daily class activities. Low percentages may indicate that teachers have difficulty accurately recounting overall class activities on surveys covering longer periods of time.

Percent of Teacher Survey and Teacher Log Nonagreement in which Teachers Underreport on the Survey (Appendix I, Columns c, f)

This calculation further explores teacher survey and log nonagreement by measuring the percent of time in which the teachers' first and second survey responses indicate that an objective or activity occurs less frequently or for less time than their daily classroom logs indicate.

The level of teacher positive response was calculated as follows:

where nonagreement,

$$\frac{\text{the number of times daily log reports show more frequent or longer use than survey responses}}{\text{total number of nonagreements between survey responses and log reports}}$$

This item helps to illuminate the direction of nonagreement between survey responses and daily activity logs A high percentage indicates that teachers' survey responses *underestimate* the frequency or length of classroom learning objective or activity compared to what occurs on a daily basis. A low percentage indicates that teachers' survey responses *overestimate* the frequency or length of classroom learning objective or activity compared to what occurs on a daily basis.

Consistency Between Case Study Teachers' First and Second Questionnaire Responses (Appendix J)

This calculation measures the consistency of teachers' first survey responses with their responses to the second survey. Consistency is measured at two levels: (1) the percent of direct agreement in which teachers' two survey responses agree; and (2) the percent of time in which responses agree within one response category.

The level of direct agreement was calculated as follows:

number of exact agreements / number of surveys

The level of agreement within one response category was calculated as follows:

number of exact agreements + number of agreements within one response category / number of surveys

These numbers show the level of overall agreement between teachers' first and second survey responses. High percentages suggest that responses changed little over time; low percentages may indicate that keeping daily logs heightened teachers' awareness of the frequency and duration with which classroom activities occur.

Appendix L

List of Items Deleted from Case Study Analyses

Appendix L

List of Items Deleted From Case Study Analysis

Following the preliminary analysis, we removed from analyses comparing case study teacher and observer responses certain sub-items for which little or no use by observers or case study teachers resulted in too few cases to assess. We eliminated those items receiving ten or fewer indications of use in the (82) records of the 41 classroom observations. This eliminated two of nine student learning objectives, four of 12 teacher actions, six of 24 student activities, and four each of eight teacher and student instructional materials.

The eliminated items are:

Student Learning Objectives

- 10c Collect data (e.g., observe, measure, count)
- 10d Order, compare, estimate, approximate

Teacher Instructional Actions

- 13c Demonstrate a concept, using three-dimensional tools such as manipulatives, models, or other objects
- 13g Provide remedial or enriching instruction to a pull-out group while the rest of the class works on assignments
- 13i Administer a test or quiz
- 13k Demonstrate uses of technology in mathematics

Student Instructional Activities

- 15i Work on projects/assignments that take a week or more to finish
- 15j Give or listen to other students give oral reports
- 15l Write a report or paper
- 15n Do lab or field work
- 15v Participate in structured cooperative learning activities
- 15w Take tests, quizzes, other assessments

Teacher Instructional materials

- 18b Graph paper
- 18c Protractors, rulers, or compasses
- 18f Film or videotape
- 18g Computer or computer programs

Student Instructional Materials

- 19e Overhead projector
- 19f Film or videotape
- 19g Computer or computer programs
- 19h Manipulatives, models, or other objects

Appendix M

Summary of Item Recommendations

Appendix M

Summary of Recommended Changes to Fieldtested Items

1	Course title	Keep, unchanged
2	Class schedule	Keep, unchanged
3	Student grade levels	Keep, unchanged depending on targeted respondents
4	Student academic abilities	Revise to be close-ended that reflects the range of expected responses
5	Class capability of learning course material	Revise to be close-ended that reflects the range of expected responses
6	Teacher influence on policy	Delete, since similar to SASS item 44
7	Teacher control	Limit to within classroom control
8	Course content	Revise substantially to reduce burden and provide more depth, or delete
9	Skills and concepts taught	
10	Student learning objectives	Revise language to improve observer validation:
11	Assessment content	
12	Interdisciplinary teaching	Eliminate, unless specialized request for information
13	Teacher instructional activities	Reduce number of subitems, revise wording of some subitems
14	Contextual factors	Reduce number of subitems
15	Student learning activities	Shorten stem; reduce number of subitems, revise wording of some subitems
16	Non-academic time	Revise to be close-ended that reflects the range of expected responses
17	Demonstrate math competencies	
18	Teacher materials	Reduce number of subitems, combine with student materials
19	Student materials	Reduce number of subitems, combine with teacher materials

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Listing of NCES Working Papers to Date

Please contact Angela Miles at (202) 219-1761 (angela_miles@ed.gov)
if you are interested in any of the following papers

Number	Title	Contact
94-01 (July)	Schools and Staffing Survey (SASS) Papers Presented at Meetings of the American Statistical Association	Dan Kasprzyk
94-02 (July)	Generalized Variance Estimate for Schools and Staffing Survey (SASS)	Dan Kasprzyk
94-03 (July)	1991 Schools and Staffing Survey (SASS) Reinterview Response Variance Report	Dan Kasprzyk
94-04 (July)	The Accuracy of Teachers' Self-reports on their Postsecondary Education: Teacher Transcript Study, Schools and Staffing Survey	Dan Kasprzyk
94-05 (July)	Cost-of-Education Differentials Across the States	William Fowler
94-06 (July)	Six Papers on Teachers from the 1990-91 Schools and Staffing Survey and Other Related Surveys	Dan Kasprzyk
94-07 (Nov.)	Data Comparability and Public Policy: New Interest in Public Library Data Papers Presented at Meetings of the American Statistical Association	Carrol Kindel
95-01 (Jan.)	Schools and Staffing Survey: 1994 Papers Presented at the 1994 Meeting of the American Statistical Association	Dan Kasprzyk
95-02 (Jan.)	QED Estimates of the 1990-91 Schools and Staffing Survey: Deriving and Comparing QED School Estimates with CCD Estimates	Dan Kasprzyk
95-03 (Jan.)	Schools and Staffing Survey: 1990-91 SASS Cross-Questionnaire Analysis	Dan Kasprzyk
95-04 (Jan.)	National Education Longitudinal Study of 1988: Second Follow-up Questionnaire Content Areas and Research Issues	Jeffrey Owings
95-05 (Jan.)	National Education Longitudinal Study of 1988: Conducting Trend Analyses of NLS-72, HS&B, and NELS:88 Seniors	Jeffrey Owings

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Number	Title	Contact
95-06 (Jan.)	National Education Longitudinal Study of 1988: Conducting Cross-Cohort Comparisons Using HS&B, NAEP, and NELS:88 Academic Transcript Data	Jeffrey Owings
95-07 (Jan.)	National Education Longitudinal Study of 1988: Conducting Trend Analyses HS&B and NELS:88 Sophomore Cohort Dropouts	Jeffrey Owings
95-08 (Feb.)	CCD Adjustment to the 1990-91 SASS: A Comparison of Estimates	Dan Kasprzyk
95-09 (Feb.)	The Results of the 1993 Teacher List Validation Study (TLVS)	Dan Kasprzyk
95-10 (Feb.)	The Results of the 1991-92 Teacher Follow-up Survey (TFS) Reinterview and Extensive Reconciliation	Dan Kasprzyk
95-11 (Mar.)	Measuring Instruction, Curriculum Content, and Instructional Resources: The Status of Recent Work	Sharon Bobbitt & John Ralph
95-12 (Mar.)	Rural Education Data User's Guide	Samuel Peng
95-13 (Mar.)	Assessing Students with Disabilities and Limited English Proficiency	James Houser
95-14 (Mar.)	Empirical Evaluation of Social, Psychological, & Educational Construct Variables Used in NCES Surveys	Samuel Peng
95-15 (Apr.)	Classroom Instructional Processes: A Review of Existing Measurement Approaches and Their Applicability for the Teacher Follow-up Survey	Sharon Bobbitt
95-16 (Apr.)	Intersurvey Consistency in NCES Private School Surveys	Steven Kaufman
95-17 (May)	Estimates of Expenditures for Private K-12 Schools	Stephen Broughman
95-18 (Nov.)	An Agenda for Research on Teachers and Schools: Revisiting NCES' Schools and Staffing Survey	Dan Kasprzyk
96-01 (Jan.)	Methodological Issues in the Study of Teachers' Careers: Critical Features of a Truly Longitudinal Study	Dan Kasprzyk

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Number	Title	Contact
96-02 (Feb.)	Schools and Staffing Survey (SASS): 1995 Selected papers presented at the 1995 Meeting of the American Statistical Association	Dan Kasprzyk
96-03 (Feb.)	National Education Longitudinal Study of 1988 (NELS:88) Research Framework and Issues	Jeffrey Owings
96-04 (Feb.)	Census Mapping Project/School District Data Book	Tai Phan
96-05 (Feb.)	Cognitive Research on the Teacher Listing Form for the Schools and Staffing Survey	Dan Kasprzyk
96-06 (Mar.)	The Schools and Staffing Survey (SASS) for 1998-99: Design Recommendations to Inform Broad Education Policy	Dan Kasprzyk
96-07 (Mar.)	Should SASS Measure Instructional Processes and Teacher Effectiveness?	Dan Kasprzyk
96-08 (Apr.)	How Accurate are Teacher Judgments of Students' Academic Performance?	Jerry West
96-09 (Apr.)	Making Data Relevant for Policy Discussions: Redesigning the School Administrator Questionnaire for the 1998-99 SASS	Dan Kasprzyk
96-10 (Apr.)	1998-99 Schools and Staffing Survey: Issues Related to Survey Depth	Dan Kasprzyk
96-11 (June)	Towards an Organizational Database on America's Schools: A Proposal for the Future of SASS, with comments on School Reform, Governance, and Finance	Dan Kasprzyk
96-12 (June)	Predictors of Retention, Transfer, and Attrition of Special and General Education Teachers: Data from the 1989 Teacher Followup Survey	Dan Kasprzyk
96-13 (June)	Estimation of Response Bias in the NHES:95 Adult Education Survey	Steven Kaufman
96-14 (June)	The 1995 National Household Education Survey: Reinterview Results for the Adult Education Component	Steven Kaufman

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Number	Title	Contact
96-15 (June)	Nested Structures: District-Level Data in the Schools and Staffing Survey	Dan Kasprzyk
96-16 (June)	Strategies for Collecting Finance Data from Private Schools	Stephen Broughman
96-17 (July)	National Postsecondary Student Aid Study: 1996 Field Test Methodology Report	Andrew G. Malizio
96-18 (Aug.)	Assessment of Social Competence, Adaptive Behaviors, and Approaches to Learning with Young Children	Jerry West
96-19 (Oct.)	Assessment and Analysis of School-Level Expenditures	William Fowler
96-20 (Oct.)	1991 National Household Education Survey (NHES:91) Questionnaires: Screener, Early Childhood Education, and Adult Education	Kathryn Chandler
96-21 (Oct.)	1993 National Household Education Survey (NHES:93) Questionnaires: Screener, School Readiness, and School Safety and Discipline	Kathryn Chandler
96-22 (Oct.)	1995 National Household Education Survey (NHES:95) Questionnaires: Screener, Early Childhood Program Participation, and Adult Education	Kathryn Chandler
96-23 (Oct.)	Linking Student Data to SASS: Why, When, How	Dan Kasprzyk
96-24 (Oct.)	National Assessments of Teacher Quality	Dan Kasprzyk
96-25 (Oct.)	Measures of Inservice Professional Development: Suggested Items for the 1998-1999 Schools and Staffing Survey	Dan Kasprzyk
96-26 (Nov.)	Improving the Coverage of Private Elementary-Secondary Schools	Steven Kaufman
96-27 (Nov.)	Intersurvey Consistency in NCES Private School Surveys for 1993-94	Steven Kaufman

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Number	Title	Contact
96-28 (Nov.)	Student Learning, Teaching Quality, and Professional Development: Theoretical Linkages, Current Measurement, and Recommendations for Future Data Collection	Mary Rollefson
96-29 (Nov.)	Undercoverage Bias in Estimates of Characteristics of Adults and 0- to 2-Year-Olds in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
96-30 (Dec.)	Comparison of Estimates from the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97-01 (Feb.)	Selected Papers on Education Surveys: Papers Presented at the 1996 Meeting of the American Statistical Association	Dan Kasprzyk
97-02 (Feb.)	Telephone Coverage Bias and Recorded Interviews in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97-03 (Feb.)	1991 and 1995 National Household Education Survey Questionnaires: NHES:91 Screener, NHES:91 Adult Education, NHES:95 Basic Screener, and NHES:95 Adult Education	Kathryn Chandler
97-04 (Feb.)	Design, Data Collection, Monitoring, Interview Administration Time, and Data Editing in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97-05 (Feb.)	Unit and Item Response, Weighting, and Imputation Procedures in the 1993 National Household Education Survey (NHES:93)	Kathryn Chandler
97-06 (Feb.)	Unit and Item Response, Weighting, and Imputation Procedures in the 1995 National Household Education Survey (NHES:95)	Kathryn Chandler
97-07 (Mar.)	The Determinants of Per-Pupil Expenditures in Private Elementary and Secondary Schools: An Exploratory Analysis	Stephen Broughman
97-08 (Mar.)	Design, Data Collection, Interview Timing, and Data Editing in the 1995 National Household Education Survey	Kathryn Chandler

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Number	Title	Contact
97-09 (Apr.)	Status of Data on Crime and Violence in Schools: Final Report	Lee Hoffman
97-10 (Apr.)	Report of Cognitive Research on the Public and Private School Teacher Questionnaires for the Schools and Staffing Survey 1993-94 School Year	Dan Kasprzyk
97-11 (Apr.)	International Comparisons of Inservice Professional Development	Dan Kasprzyk
97-12 (Apr.)	Measuring School Reform: Recommendations for Future SASS Data Collection	Mary Rollefson
97-13 (Apr.)	Improving Data Quality in NCES: Database-to-Report Process	Susan Ahmed
97-14 (Apr.)	Optimal Choice of Periodicities for the Schools and Staffing Survey: Modeling and Analysis	Steven Kaufman
97-15 (May)	Customer Service Survey: Common Core of Data Coordinators	Lee Hoffman
97-16 (May)	International Education Expenditure Comparability Study: Final Report, Volume I	Shelley Burns
97-17 (May)	International Education Expenditure Comparability Study: Final Report, Volume II, Quantitative Analysis of Expenditure Comparability	Shelley Burns
97-18 (June)	Improving the Mail Return Rates of SASS Surveys: A Review of the Literature	Steven Kaufman
97-19 (June)	National Household Education Survey of 1995: Adult Education Course Coding Manual	Peter Stowe
97-20 (June)	National Household Education Survey of 1995: Adult Education Course Code Merge Files User's Guide	Peter Stowe
97-21 (June)	Statistics for Policymakers or Everything You Wanted to Know About Statistics But Thought You Could Never Understand	Susan Ahmed
97-22 (July)	Collection of Private School Finance Data: Development of a Questionnaire	Stephen Broughman

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Number	Title	Contact
97-23 (July)	Further Cognitive Research on the Schools and Staffing Survey (SASS) Teacher Listing Form	Dan Kasprzyk
97-24 (Aug.)	Formulating a Design for the ECLS: A Review of Longitudinal Studies	Jerry West
97-25 (Aug.)	1996 National Household Education Survey (NHES:96) Questionnaires: Screener/Household and Library, Parent and Family Involvement in Education and Civic Involvement, Youth Civic Involvement, and Adult Civic Involvement	Kathryn Chandler
97-26 (Oct.)	Strategies for Improving Accuracy of Postsecondary Faculty Lists	Linda Zimbler
97-27 (Oct.)	Pilot Test of IPEDS Finance Survey	Peter Stowe
97-28 (Oct.)	Comparison of Estimates in the 1996 National Household Education Survey	Kathryn Chandler
97-29 (Oct.)	Can State Assessment Data be Used to Reduce State NAEP Sample Sizes?	Steven Gorman
97-30 (Oct.)	ACT's NAEP Redesign Project: Assessment Design is the Key to Useful and Stable Assessment Results	Steven Gorman
97-31 (Oct.)	NAEP Reconfigured: An Integrated Redesign of the National Assessment of Educational Progress	Steven Gorman
97-32 (Oct.)	Innovative Solutions to Intractable Large Scale Assessment (Problem 2: Background Questionnaires)	Steven Gorman
97-33 (Oct.)	Adult Literacy: An International Perspective	Marilyn Binkley
97-34 (Oct.)	Comparison of Estimates from the 1993 National Household Education Survey	Kathryn Chandler
97-35 (Oct.)	Design, Data Collection, Interview Administration Time, and Data Editing in the 1996 National Household Education Survey	Kathryn Chandler
97-36 (Oct.)	Measuring the Quality of Program Environments in Head Start and Other Early Childhood Programs: A Review and Recommendations for Future Research	Jerry West

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Number	Title	Contact
97-37 (Nov.)	Optimal Rating Procedures and Methodology for NAEP Open-ended Items	Steven Gorman
97-38 (Nov.)	Reinterview Results for the Parent and Youth Components of the 1996 National Household Education Survey	Kathryn Chandler
97-39 (Nov.)	Undercoverage Bias in Estimates of Characteristics of Households and Adults in the 1996 National Household Education Survey	Kathryn Chandler
97-40 (Nov.)	Unit and Item Response Rates, Weighting, and Imputation Procedures in the 1996 National Household Education Survey	Kathryn Chandler
97-41 (Dec.)	Selected Papers on the Schools and Staffing Survey: Papers Presented at the 1997 Meeting of the American Statistical Association	Steve Kaufman
97-42 (Jan. 1998)	Improving the Measurement of Staffing Resources at the School Level: The Development of Recommendations for NCES for the Schools and Staffing Survey (SASS)	Mary Rollefson
97-43 (Dec.)	Measuring Inflation in Public School Costs	William J. Fowler, Jr.
97-44 (Dec.)	Development of a SASS 1993-94 School-Level Student Achievement Subfile: Using State Assessments and State NAEP, Feasibility Study	Michael Ross
98-01 (Jan.)	Collection of Public School Expenditure Data: Development of a Questionnaire	Stephen Broughman
98-02 (Jan.)	Response Variance in the 1993-94 Schools and Staffing Survey: A Reinterview Report	Steven Kaufman
98-03 (Feb.)	Adult Education in the 1990s: A Report on the 1991 National Household Education Survey	Peter Stowe
98-04 (Feb.)	Geographic Variations in Public Schools' Costs	William J. Fowler, Jr.

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Number	Title	Contact
98-05 (Mar.)	SASS Documentation: 1993-94 SASS Student Sampling Problems; Solutions for Determining the Numerators for the SASS Private School (3B) Second-Stage Factors	Steven Kaufman
98-06 (May)	National Education Longitudinal Study of 1988 (NELS:88) Base Year through Second Follow-Up: Final Methodology Report	Ralph Lee
98-07 (May)	Decennial Census School District Project Planning Report	Tai Phan
98-08 (July)	The Redesign of the Schools and Staffing Survey for 1999-2000: A Position Paper	Dan Kasprzyk
98-09 (Aug.)	High School Curriculum Structure: Effects on Coursetaking and Achievement in Mathematics for High School Graduates—An Examination of Data from the National Education Longitudinal Study of 1988	Jeffrey Owings
98-10 (Aug.)	Adult Education Participation Decisions and Barriers: Review of Conceptual Frameworks and Empirical Studies	Peter Stowe
98-11 (Aug.)	Beginning Postsecondary Students Longitudinal Study First Follow-up (BPS:96-98) Field Test Report	Aurora D'Amico
98-12 (Oct.)	A Bootstrap Variance Estimator for Systematic PPS Sampling	Steven Kaufman
98-13 (Oct.)	Response Variance in the 1994-95 Teacher Follow-up Survey	Steven Kaufman
98-14 (Oct.)	Variance Estimation of Imputed Survey Data	Steven Kaufman
98-15 (Oct.)	Development of a Prototype System for Accessing Linked NCES Data	Steven Kaufman
98-16 (Dec.)	A Feasibility Study of Longitudinal Design for Schools and Staffing Survey	Stephen Broughman
98-17 (Dec.)	Developing the National Assessment of Adult Literacy: Recommendations from Stakeholders	Sheida White

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1999-01 (Jan.)	A Birth Cohort Study: Conceptual and Design Considerations and Rationale	Jerry West
1999-02 (Feb.)	Tracking Secondary Use of the Schools and Staffing Survey Data: Preliminary Results	Dan Kasprzyk
1999-03 (Feb.)	Evaluation of the 1996-97 Nonfiscal Common Core of Data Surveys Data Collection, Processing, and Editing Cycle	Beth Young
1999-04 (Feb.)	Measuring Teacher Qualifications	Dan Kasprzyk
1999-05 (Mar.)	Procedures Guide for Transcript Studies	Dawn Nelson
1999-06 (Mar.)	1998 Revision of the Secondary School Taxonomy	Dawn Nelson
1999-07 (Apr.)	Collection of Resource and Expenditure Data on the Schools and Staffing Survey	Stephen Broughman
1999-08 (May)	Measuring Classroom Instructional Processes: Using Survey and Case Study Fieldtest Results to Improve Item Construction	Dan Kasprzyk

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